Paige (A)

Electropathic guide

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THE

ELECTROPATHIC GUIDE:

DEVOTED TO

ELECTRICITY,

AND

ITS MEDICAL APPLICATIONS.

BY DR. A. PAIGE.

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PREFACE.

The present issue of the ELECTROPATHIC GUIDE, is quite entirely a reprint of a semi-annual number published in Boston, Mass., in the year 1849. So favorable was its reception, in that form, that several thousand copies were disposed of in a few months. It was then permitted to go out of print, as the author had in course of preparation a full and complete treatise upon the practice to which it is devoted, but which the incessant duties of his profession have delayed to the present time, and must still delay.

Incomplete as it is, it will be found a valuable assistant to those who would inform themselves in relation to the physiological relations, and great medical advantages of that mysterious agent, so nearly allied to vitality, *electricity*.

The critic's eye will detect throughout the work, an apparent want of connection in the selections presented, which is to be attributed to an effort to present too much in the space allotted.

The copious extracts introduced, are from authors of high position in the profession, and it is hoped they alone are sufficient to protect the work against the derision of being an empirical enarration.

The description of instruments and remedies employed in the practice, are principally in the language of their inventors, and, so far as possible, their application in the treatment of diseases, is in the language of those who have employed them. Where able to do so, the author's or inventor's name has been given in its proper connection, with proper acknowledgments for the liberties taken.

The cases tested and diseases cured, under the author's own observation, have been multiplied, since the first issue of the Guide,

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THE

ELECTROPATHIC GUIDE.

As a system, or branch of medical practice, Electropathy is based upon the principles of electricity, which, in the hands of the Creator, it recognizes as the organizing, animating, and sustaining power. Disease is the effect of violating its principles, and to be removed by medicines that act in harmony therewith. In theory, this system calls to its aid the discoveries made in the science, from its earliest history; in practice, the experiments and observations of the most eminent naturalists and physiologists connected with the medical profession, both in the old and new world; to which is here added the experience of one, who has devoted several years of the most vigilant labor exclusively to the practice.

The attractive and repulsive force of this agent, first led to the discovery of its existence. This was by Thales, of Miletus, 600 years before Christ. "He noticed that amber, when rubbed, had the property of attracting light bodies; and from the Greek name of this substance, (electron) originated the term by which this branch of science has since been known." Some two centuries after this, Theophrastus, a pupil of Aristotle, discovered the same property of attraction in a mineral called tourmalin. Few other discoveries, or improvements were made, until the 16th century, except the addition of jet and agate, to the two former attractive substances, when the subject was revived by William Gilbert, and Robert Boyle, of England, Otto Guericke of Germany, and new discoveries made, and

the first instruments invented for exciting electricity, by Hawksbee.

In all early discoveries in the science, one fact is worthy of particular notice. The existence of electricity has been noticed by its exhibiting the attractive and repulsive force. True, this property of this subtle agent was first noticed in some of the more common inanimate substances; but lately, discoveries have been made, which as clearly prove its existence in animate bodies, and that its attractive and repulsive force is there exercised, giving to the various organs of the living structure the power of vital action.

No other agent is found in the universe, by the aid of which the various attractions can be illustrated. In either a positive, or negative state, it pervades all matter; and the conclusion seems not unreasonable, that it becomes in all the "universal law." The various forms of attraction are necessarily exercised for the preservation of all organized bodies, every variation in their force affecting their organization; if, then, it be admitted that electricity constitutes that force, it at once becomes the organizing and preserving power.

These conclusions, though seemingly quite foreign, are intimately connected with our subject; nay, they even constitute the foundation of any system, having for its object the regulating and controling of the vital functions. Though mysteriously complicated in its structure and the combinations of its constituent properties, and highly elevated in view of the nature and destiny of its superior inhabitant, the human mechanism is matter, and subject to the common law of matter. Surrounding elements have their influence in inducing disease, and should be employed in effecting cures. In medical practice, matter is to be regulated by matter, vitality by the vitalizing power. Such is the importance of understanding the principles and applications of this effectual, safe, and universal agent.

The identity of electricity and animal life, a theory already entered upon by different naturalists, though here adopted in the abstract, is not received in its unqualified sense. Nor is the identity essential to the practice advocated. As has been stated, electricity exists in all matter; yet it is only in the most

insignificant sense, that animal life exists in all matter. Vegetables are supposed to possess much electricity, and, in their growth, are peculiarly under its influence, yet their life is not animal. In its action upon different combinations of matter, and its elements, its effects are essentially different; hence, its operations upon certain minerals are called magnetism, etc. When acting upon the constituents of vegetable matter, in its organism, the effect produced is called vegetable life. But the combination is necessary, or the life ceases; so with animal existence. When electricity operates, under peculiar modifications, upon the varied and peculiar properties of matter constituting the animal organism, it produces the wonderful phenomenon called animal life. While that combination is continued, and its action is felt, life exists; but if the combination ceases, or its action is recalled, life ceases. Distinctively, therefore, life is in neither, but entirely the result of the mysterious combination.

From numerous observations, by different authors, the opinion is pretty generally entertained, that, besides the electro-positive and electro-negative, electricity exists in the animal in two states, viz., a *latent* state, and an *active* state. The first is that state in which it seems to be produced by the chemical actions of the nervous tissues; the second is that in which it passes in currents between organs differing in their temperature and chemical constitution. The existence of such currents is no longer a question in physiology, the only questions being—how do they affect the vital force, and how may they be excited, or modified in their action? The opinion of Liebig upon this subject is ably presented by Carpenter, in a work called Human Physiology, §§ 377 and 77, where he says: "A great variety of evidence has been, for some time, conducting physiologists to the opinion, that every act of muscular contraction necessarily involves the death and disintegration of a certain amount of muscular tissue: and it has recently been argued by Liebig, that this disintegration, resulting from the action of oxygen upon the elements of which the tissue is composed, is the real source of the mechanical power, by setting at liberty (so to speak) the vital force, which was previously employed in a *latent* manner,

in holding together components of the structure. Certain it is, that the amount of muscular power exercised by an animal, bears a very close resemblance (other things being equal), on the one hand, to the measure of oxygen introduced into the system by the lungs; and on the other, to the amount of those excretions which seem especially produced by this metamorphosis. This doctrine may probably be extended from the muscular system,—in regard to which alone it has been urged by Liebig,—to the nervous, as well as to the various organs of nutrition. Many circumstances lead to the belief, that the nervous tissue, when in a state of functional activity, undergoes a rapid waste of disintegration, and a corresponding renewal."

The waste of disintegration here spoken of, seems but the exhaustion of the electrical force, and is so explained by Professor Faraday, in speaking of the electrical endowments of the gymnotus. See his Experimental Researches, series XV., Nov., 1838. "The anatomical relation of the nervous system to the electric organs; the evident exhaustion of the nervous energy, during the production of electricity, in that organ; the apparently equivalent production of electricity, in proportion to the quantity of the nervous force consumed; the constant direction of the current produced, with its relation to what we may believe to be an equally constant direction of the nervous energy, thrown into action at the same time—all induce me to believe, that it is not imposible but that, on passing electricity per force through the organ, a reaction back upon the nervous system belonging to it might take place, and that a restoration, to a greater or smaller degree, of that which the animal expends in the act of exciting a current, might, perhaps, be effected. . . So, perhaps, in these organs, where nature has provided the apparatus, by means of which the animal can exert and convert nervous into electric force, we may be able, possesssing, in that point of view, a power far beyond that of the fish itself, to reconvert the electric into the nervous force.

"With respect to the nature of nervous power, that exertion of it which is conveyed along the nerves to the various organs which they excite into action, is not the direct principle of *life;* and therefore I see no natural reason, why we should not be

allowed, in certain cases, to determine, as well as to observe its course. Many philosophers think the power is electricity. Priestley put forth this view, in 1774, in a very striking and distinct form, both as regards ordinary animals, and those which are electric, like the torpedo. Dr. Wilson Philip considers that the agent is electricity, modified by vital action. . . . . Now, though I am not as yet convinced by the facts, that the nervous fluid is only electricity, still I think that the agent in the nervous system, may be an inorganic force; and, if there be reason for supposing that magnetism is a higher relation than electricity, so it may well be imagined that the nervous power may be of a still more exalted character, and yet within the reach of experiment."

In the London Lancet for September, 1847, Professor Matteucci admits that "there is certainly an analogy between electricity and the nervous force, which, if it be not equally manifest, is however, of the same kind as those which we know exist between caloric, light and electricity;" and then, instead contending for their identity, says, "excitability of the nerves can be awakened, and give rise to sensation and muscular movements, in the same manner by heat, and mechanical or chemical action, as by electricity." These mechanical, chemical and calorific actions which he concludes are not transformed into electrical currents before they impart vital force to the nerves, we have reason to believe, are each but electricity operating under different modifications. As evidence of this fact, we here present an interesting correspondence from J. C. Atkinson, Esq., M. R. C. S., etc., Westminister, published in the Lancet, being addressed to the editor of that journal. "I am desirous at the present moment, of directing the attention of your numerous scientific readers to a very interesting phenomenon, more or less prevalent in the collapse stage of cholera, which seems hitherto to have escaped the observation of medical men, viz., animal electricity, or phosphorescence of the human body. My attention was first attracted to the subject, during the former visitation of that fearful disease in the metropolis. It was indeed singular, to notice the quantity of electric fluid which continually discharged itself, on the approach of any conducting

body, to the surface of the skin of a patient, laboring under the collapse state, more especially if the patient had been previously enveloped in blankets; *streams of electricity*, many averging *one inch and a half* in length, could be readily educted by the knuckle of the hand, when directed to any part of the body; and these appeared, in color, effect, crackling noise, and luminous character, similar to that which we are all accustomed to observe, when touching a charged Leyden jar. I may remark the coincidence, that simultaneously with the *heat* of the body passing off, the *electrcity was evolved;* and I am therefore led to ask the question—Are not heat, electric and galvanic fluids, one and same thing? Does not the fact of the passing off of both imponderable substances, at one and the same time, strengthen this conclusion?

"Again: Are not the whole of what we call *vital* phenomena, produced by certain modifications of the electric-galvanic-magnetic matter and motions? And do we not find that these *vital* phenomena are continually affected by the relative state of the surrounding electric medium? To what can we attribute the present fluctuating condition of the barometer, if not to it?

"We *know* what wonderful *decomposing* action galvanism had on alkalies, under the hands of the illustrious Humphrey Davy; but we do *not know*, nor have we any conception, in the present state of knowledge, of the *decomposing* action of electric matter of the atmospheric air, in various conditions, on the fluids generally of the animal body. Chemistry has failed in pointing out any ponderable material, as the exciting cause of epidemic diseases.

"In the treatment of cholera, all are agreed that *non-conducting* substances on the surface of the skin, aid essentially in the cure; and during the disturbed state of the atmosphere, for the purpose of retaining the electricity continually eliminating in the system, we are told to wear woolen bandages, flannel, and gutta percha soles, so as to insulate as much as possible the body, to prevent the heat—the electric fluid—from passing off."

With our present knowledge upon the subject, it is true we may not be able, definitely, to explain the connection this agent has with the various combinations constituting the animal body,

or the precise method in which it excites vital action; enough, however, is known, to prove that such connection is indispensable to vital action; and that it may be influenced or controlled by numerous agents, producing a greater or less amount of vital energy. This fact, alone, enables us to give an extensive classification of electropathic remedies, and to reduce their use to a system comparatively perfect. Indeed, every agent in the universe becomes an electropathic remedy, as all matter, whether organic or elementary, is supposed to be under the influence of electricity, and to exert either a positive or negative influence upon our systems, when brought in contact. In view, however, of the two distinct forms under which it exists, already recounted, they are naturally divided into two classes. Other divisions will be noticed, as our work progresses.

First, agents adapted to the *latent*, or neutral state of electricity, which may be called a state of rest, or equilibrium. "This form of electricity," says Dr. Golden Bird, "is possessed by the living fabric, in accordance, apparently, with the general laws of the universal diffusion of this agent throughout all matter, whether dead and inert, or quick and animated with the flame of life." This seems to be the state in which it exerts its universal power of attraction—the "strong embracing force." For health, this state is to be properly preserved in the human system, where, perhaps, from numerous causes, it is more liable to be disturbed than in any other substance. This preservation, as well as its restoration, when lost, involves the various chemical decompositions ever taking place in the body, and the disturbing influences by which it is surrounded.

As all substances possess a given amount of electricity, their decomposition necessarily sets at liberty the amount they contain, when it either enters other substances and remains in its latent state, or is excited to action. Upon this point, Dr. Bird says: "It is impossible that two elements can be rent asunder, without setting free a current of electricity, which, insignificant as it might theoretically appear, is nevertheless competent to the production of many important phenomena. As one among many examples, I would cite the case of common salt, which plays so important a part as an article of food, and for which,

perhaps alone of all condiments, a universal appetite exists. In addition to the proportion of this substance, which enters the blood unchanged and becomes an element of all the secretions, a part is decomposed, and one element in union with hydrogen appears, as hydrochloric acid in the stomach; another in union with oxygen, constitutes, as soda, an important constituent of the bile. . . . . Under the influence of a weak current, salts can be resolved into their component elements. In this way, a compound can be separated into its constituent acid and base. Now it is a remarkable fact, that if an acid and electric solution be so placed, that their union be effected through parieties of an animal membrane, or indeed any other porous the diaphragm, a current of electricity is involved. This fact was first noticed by Becquerel, and has since been found to be true, not only with nitric acid and potass, during whose combination he observed this disturbance of electric equilibrium, but with all other acids, and soluble bases. Now, with the exception of the stomach and coecum, the whole extent of the mucous membrane is bathed with an alkaline mucous fluid, and the external covering of the body, the skin, is as constantly exhaling an acid fluid except in the axillary and perhaps pubic regions. The mass of the animal frame is thus placed between two great envelopes, the one, alkaline, and the other, acid, meeting only at the mouth, nostrils, and anus."

There are, then, two grand principles in medical practice here established. First, the mucous membrane, and the external covering or skin, are to be always properly exposed to the chemical action of alkaline, and other acids; and, second, those acids are to be provided when deficient, and permitted to have their proper action upon the several membranes, as the case requires. If, by any means, this arrangement for the generating of electricity be disturbed, a deficiency for the functional support of the system is the result, and disease follows. The amount of electricity furnished the system by this process, is by no means unimportant, especially, if we consider the amount possessed by substances decomposed. Professor Faraday deduces from his experiments, published in his researches on the absolute quantity of magnetism in matter, the interesting fact that

the quantity of electricity, belonging to compound substances, is identical with the quantity necessary for the separation of their elements; and that a single grain of water contains as much electricity, as is required to charge 800,000 Leyden jars, of usual capacity. If this be indeed true, and we have no reason to doubt his authority, cold water may well be placed among the first and most effectual electropathic remedies.

But, second, the dynamic state, or currents of electricity in motion, sustains the organic functions; and the manner in which this state is induced, and the principles upon which it is regulated, claim our attention. The nervous system seems to be the medium through which electricity traverses the animal organism, exerting vital action, by whatever means its currents are excited. It is also well known, that it is upon the nervous energy that mental and organic power depends. A series of experiments has proved that all the functions of the nervous power, may be performed by electricity variously employed. The familiar experiment of Dr. Philip upon the nerves of the stomach affords a most striking illustration. The eighth pair of nerves was separated when the secretion of the gastric juice in the stomach was suspended. The voltaic current of electricity was passed through the divided portion of the nerves next the stomach, when the secretion was restored, as before the separation took place. For some time, the accuracy of the experiment upon which this conclusion was formed, was questioned, but more recently established, by its careful repetition, at the Royal Institution, by Dr. Philip, in conjunction with Mr. Brodie. It may here be added, that Dr. Philip contends for the identity of electricity, galvanism, and the nervous influence; and that by its mechanical application, the stomach, when otherwise inactive, and the lungs when in a state of torpor, may be aroused to healthy action.

When passed in opposite directions through the nerves, or when excited by different agents, electricity produces very different results; hence, the disappointment of many who have attempted its use, and hence, too, the absolute necessity of reducing its use to a system, that different results may be produced as different cases may require. These results have been

noticed as the effect of different experiments, and have led to some of the most amusingly-absurd ideas, in regard to the nature and "medical properties" of the "mysterious agent." It has been called an irritant, and a tonic, by some, while others have declared that in it they have found a diuretic, and others still, that it affords the only real emmenagogue in nature. Upon the experiments from which such inferences are drawn, we might ascribe to it the medical properties of nearly every agent in the whole metaria medica. Rightly employed, it will move the bowels in the most severe cases of constipation, or effect vomiting, when an emetic is indicated. It is one of the most active discutients, and may he employed in cauterizing. All these apparently different properties, depend upon the part more directly under its influence—the different nerves upon which its action is felt, the direction in which its currents pass, and the manner in which they are excited. To those who would attempt its use, this fact cannot fail of affording great assistance. It is strongly urged by those acquainted with the practice; and, as it is our object to present as corroborative evidence the opinions of different authors, a few extracts will here be furnished.

Dr. Bird, in the Medical Gazette of May 21st, 1847, says: "The effects of an electric current upon a nerve, and consequently on the muscle it supplies, remarkably differ according to the direction it pursues. This observation is one of the greatest interest and importance; and in repeating it, the only precaution that is necessary to observe all the phenomena I am about to describe, is that of using as weak a current as possible. . . . . Muscular contractions are developed in the most perfect manner, when the positive current travels the limb in the presumed direction of the *vis nervosa;* hence, in repeating Galvani's experiment, (the experiment of the frog) the contractions are more powerful, when the zinc is connected with the lumber nerves, and the copper or silver plate with the muscles of the toes, because in this arrangement the positive current traverses the arc from the copper to the zinc, and then down the limb back to the copper. If care be taken to keep the leg of the frog sufficiently long to diminish its irritability, no contractions whatever will ensue, in making contact between

the zinc and copper plates, if their direction be reversed; but in this case contractions ensue in breaking contact, from the arrangement of the normal electricity in the direction of the *vis nervosa*. . . . . If in a living frog the legs be separated from the trunk, by the division of all intervening structure, except the sciatic nerves, by which communication is kept up between the several portions, and a current be transmitted, very instructive results bearing upon these facts are observed. For when a direct current is allowed to traverse the body of the animal along the nerves to the legs, violent convulsions occur; whilst if the direction of it be reversed, no motion whatever occurs, but the frog will express its sense of pain by audible croaking. The application of the galvanic stimulus thus lends much support to the opinion of the really double structure of the so-called nerves of sensation and voluntary motion, for we have seen that when travelling in the direction of the ramifications of the nerves, a centrifugal motion is excited; and when in the opposite direction, a centripetal sensation is also excited, and not the slightest motion occurs, if all communicatian with the spine is cut off,—a fact which admits of ready explanation by the views of Dr. Marshall Hall, to whose patient ingenuity and talent, this portion of physiology stands so deeply indebted."

M. Matteucci, after a series of experiments, adopts the following conclusions:—"1st. The contraction excited by an electric current, and transmitted through a mixed nerve, in the direction of its ramifications, and which is consequently termed the *direct*, is always more energetic than that which this same current gives rise to when traversing the nerve in the opposite direction. 2nd. The *direct* current rapidly weakens and destroys the excitability of a nerve, whilst, on the contrary, the passage of the *inverse* current augments it within certain limits. 3d. To produce these effects, it is necessary that the action of the *direct*, as well as that of the *inverse*, should be continued upon the nerve for a certain time, which will be of longer duration, according as its excitability is more feeble."

Again, in the Lancet of September 4th, 1847, he recapitulates the conclusions, drawn from numerous experiments, as follows: "1st. Electricity is the only irritant which has the power of

exciting at one time, sensation, and at another, contraction, according to the direction in which it traverses a nerve. 2d. The electrical current alone, when passing transversely through a nerve, does not produce any of the phenomena due to the excitability of the nerve. 3d. The electrical current does not produce any effects upon the nerves, or rather, it occasions neither contraction nor sensation, when its action upon a nerve is prolonged. 4th. The electric current alone has the property of modifying the excitability of a nerve, even of destroying it rapidly, if it circulate in a certain direction; and preserves or augments it, on the contrary, if it circulate in an opposite direction. 5th, and lastly, the electrical current alone has the power of awakening the excitability of the nerve when much enfeebled, after a longer interval of time, than any other stimulant."

These conclusions, it will be borne in mind, are drawn from experiments with what is termed mechanical electricity, or currents induced by the aid of instruments, and, so far as this form of electricity is concerned, they are adopted as correct. This is the form in which it is chiefly employed in practice, but, upon principles which have already been more than intimated, it is variously induced by other means, and other, and numerous remedies are to be employed.

Electrical currents are not only induced, but changed in their course, by the influence of conducting and non-conducting substances. Such influences are felt in their effects upon the currents supposed to be passing upon the nerves, in inducing and aggravating disease. In the numerous changes peculiar to our climate, from dry to wet, and from wet to dry, by which the very atmosphere, as well as our rooms and all with which we come in contact, almost, is changed from a conductor to a non-conductor, and vice versa, these influences are peculiarly felt. Remedies adapted to these changes are essential, and as different as the changes themselves.

But another subject presents itself in this connection worthy of especial inquiry. Is the actual condition of the nervous force to be determined by this agent? Can its variations, and their effects upon different muscles and organs, be ascertained with

that certainty requisite to justify a resort to remedies? As a stronger or weaker current, when passing upon the nerves generally, or upon a single nerve, must exercise a corresponding influence, and as it is evident that influence must vary as the force of the current varies, possessing too, as we do, the means of changing the tensity or intensity of such currents at pleasure, an affirmative answer seems but reasonable. The nerves and tissues when inflamed, or otherwise diseased, are found, invariably, to be more sensitive to the passage of electricity. Muscles that are weak are more easily contracted, and parts paralyzed, are often nearly insensible to even the strongest shocks. In another department of this work, this division of our subject will be more fully presented, and rules for electropathic diagnosis given.

In general terms, then, we have here a system of medical practice, based upon what seems to be the fundamental laws of matter. A brief review of what has been presented, will show that the claims of electropathy, if not demonstrated, are at least justified by science, the observation and experience of able minds. The human system is made to occupy its proper position in the world of matter, and spoken of as a thing that is. Its various functions are explained upon principles that come within the comprehension of those minds that are required "to watch over, and to keep it in order." Disease is looked upon as a natural effect, and to be treated upon natural principles. Remedies are classified without the language of mystery, and the vital force brought within their influence. A system for diagnosis, or the examination of diseases, is suggested, through which they may be applied understandingly. Many centuries have passed since the foundation of this practice was began, the most able and distinguished naturalists and philosophers of the age are among its defenders, and by its success thus far, we may add, the Great Comptroler of matter and mind.

At different times, the practice has fallen into disrepute, not having been reduced to a proper system, and defended by proper advocates. To use the words of Professor Wisgrill, when addressing the Medical Association of Vienna, as published in the British and Foreign Medical Review for April, 1845,

"There has now a revolution taken place in favor of electricity, which, after its wide celebrity at the commencement of the present century, had fallen into disuse, *not from the inefficiency of the means*, but from the mode in which they were employed." With the warning of the past for our admonition, the experience and counsel of the wise for our guide, the abundant success with which our efforts thus far in the practice have been crowned, for our encouragement, let those of us who have commenced the work, go forward in a practice so safe, so valuable, and immediate in its results.

CLASSIFICATION OF REMEDIES.

As has been suggested in the preceding remarks, all substances are more or less under the controling influence of electricity; consequently, they may all perhaps be directly or indirectly employed as electropathic remedies. At present, however, our classification is more limited, in a description of which they will be included in three divisions. 1st, mechanical, or instrumental; 2d, chemical, or soluble; 3d, mechanical and soluble united.

First.—*Mechanical, or Instrumental.* This involves a description of instruments, both simple and more complicated, by which electricity is excited and conducted, with their invention.

1. Friction, or the rubbing together of different substances, like amber, sealing-wax, etc., excites electricity, and numerous methods for thus operating in cases of diseases are found beneficial.

2. Electrical recession, or the transmission of electricity, when mechanically induced. This was first discovered as a property of electricity by Otto Guericke, of Germany, known as the inventor of the air-pump, who invented a machine for the purpose in 1670, by mounting a globe of sulphur upon an axis. Hawsbee, in 1709, substituted glass for the sulphur globe, by which improvement he was enabled to obtain the fluid more rapidly, and to offer many new experiments. When to this invention we add the advantages of the discovery of conducting

and non-conducting substances by Stephen Gray, in 1729, and the addition to the globe machine of the Prime Conductor, by Professor Boze, of Wirtemburg, in 1742, we have a machine comparatively perfect.

3. *The Leyden Jar and Discharger* are indispensable auxiliaries in the application of mechanical electricity. The first was discovered by Mr. Cuneus, of Leyden, in 1745, and at first, consisted of a bottle or vial of water only, with a nail passed through the cork. The discovery of this simple instrument, it is asserted, "produced a remarkable sensation throughout Europe, in consequence of the wonderful and marvellous effects attributed to the shock which was thus obtained." This instrument, so simple in its origin, like the others to which we referred, has been greatly improved upon by modern mechanics, to several of whom, in Boston, we are indebted for the description which follows.

The Leyden Jar, as improved, consists of a glass jar, of any convenient size, "coated inside and outside with tin-foil, to within one to three inches of the top, or mouth of the jar. The best jars have welts or rims on the edge of the mouth, to strengthen them. To the top of the jar a cover is fitted, usually of baked mahogany, through the centre of which passes a metallic rod, to which the chain is fastened, reaching down to the bottom of the jar, to discharge the inside coating; the top of this stem, which rises several inches above the jar, terminates in a brass ball, to receive the fluid."

For the purpose of retaining a greater quantity of the fluid, to be discharged in one shock, several such jars are often united in a box, with the inside coatings connected together by rods or chains, while the outside rests upon the bottom of the box, also coated with tin-foil, connected with a ball at the outside of the box, representing the outside of all the jars. This instrument is called an ELECTRIC BATTERY, and may be so extensive as to give a shock almost equal to the thunderbolt itself. In certain cases of disease, it becomes a highly useful remedy.

Dischargers are indispensable in connection with the use of the battery or jar. For convenience they are of different construction.

Universal Discharger. This instrument enables us to pass a full charge from the jar or battery through a body in any given direction. "It consists of two glass pillars mounted upon a mahogany base, to the tops of which are movable joints: to these joints, tubes are fastened, through which rods slide, having on one of the ends *points*, covered with balls, and spring forceps at the other." Between the two is a properly insulated table, upon which the object to be operated upon rests. Important results often follow the judicious use of this instrument, not to be otherwise effected.

"*Jointed Discharger.* This instrument has a brass hinge joint, with curved arms, like large forceps, which may be opened at pleasure, to permit the discharge to be made at different distances. The handles being of glass, the charge of a battery or jar, may be conducted to any other body without the operator experiencing any shock."

The Single Ball Discharger consists of a glass handle, to which is attached a brass ball by means of a stem and cap, with a long rod and chain. These in medical use are known as "directors," and when employed, the chain is placed near the outside of the jar, and the ball brought to the ball of the jar.

4. Cylinder and Plate Machines. These are the instruments now generally used for exciting electricity by friction, the latter of which is more recently preferred.

Those of the former consist of a glass cylinder, from six to ten inches in diameter, mounted with fancy-wood caps, and handles between two upright pillars, fixed to the base by means of screws and nuts, and turned by a crank attached to one of the axles. Upon one side of the cylinder is a glass pillar, having a cap upon the top, terminating in a flat brass spring, to which is fastened the cushion or rubber, and to this is sewed the silk flap which passes round the under side of the cylinder to within a few inches of the points of the conductor. The prime conductor is a cylinder of japanned tin, polished brass hemispherical ends; sharp pointed wires at one end, at the other a wire and ball, and the whole is supported upon a glass pillar. In the top there is also a small tube, in which is placed the pith ball electrometer.

Plate Machines, which, for various reasons, are now more

generally in use, differ much in their construction, each manufacturer having some peculiarity of taste; but their action is much the same. The most convenient, elegant and efficient of of this kind, consists of a circular plate of glass, from eighteen to forty-eight inches in diameter, turning vertically on an axis that passes through its centre, by means of a crank. It is furnished with rubbers on each side, to which the silk flap is attached, inclosing about one half the plate. The prime conductor is of sheet brass, and highly polished, and the whole rests upon four glass pillars, secured upon a fine mahogany base. The instrument is easily worked, and not peculiarly liable to get out of repair.

5. Acting upon the same principle with these machines, very simple contrivances are often found convenient. A piece of silk ribbon drawn between two pieces of rabbit skin, fitted to cover the first and second fingers, if held over a small jar, will soon sufficiently charge it to give quite a violent shock. A piece of glass tube, two or three feet in length, if rubbed briskly with a piece of silk, or wash-leather covered with amalgum, will soon emit electricity enough for many purposes. Page's electrical syringe is founded upon this principle, and is quite a convenient instrument. The piston serves as a rubber, to excite the inside of a glass barrel, "from which electricity is collected by small points attached to the piston, and conveyed by a chain to the brass cap at the lower end, to which, by means of a hook, a small jar may be attached and charged."

Electricity, induced by any of this class of instruments, is possessed of similar properties, and found peculiarly adapted to certain classes of disease. It may be applied in the form of the *Electric Bath*, which is by insulating the patient, or placing him upon a stool or chair, with glass supporters, and electrifying him, allowing him to remain in this state, until the electric fluid insensibly makes its escape; or by drawing it out in sparks at such points as you please, or by concentrating it upon any single organ, or portion of the system, as the case requires. By the aid of the jars and dischargers, or conductors, it may also be applied in the form of shocks, of greater or less intensity, as the judgment of the operator may dictate.

Each of these methods has its peculiar effect, and though other remedies may be adapted to a greater variety of diseases, these are not to be dispensed with.

Second. *Chemical or Soluble Remedies* are those, which, when applied to the system either internally or externally, change or regulate the chemical actions of the system, increasing or diminishing the vital force. We have already quoted from Dr. Bird (see page 15,) at considerable length, upon the chemical decompositions of the body, and their influence in disturbing the equilibrium of electricity in the system. In continuation of the subject, Dr. Bird says: "Within the last few months, the results of some researches of Liebig have rendered it very probable that a large proportion of the electricity of muscular structures, is owing to the mutual reaction of an acid and alkaline fluid. Every one is aware that the blood, in a healthy state, exerts a decided and well-marked alkaline action on test-paper: now it is remarkable that although a piece of muscular flesh contains so large a proportion of alkaline blood, still that when chopped up, and digested in water, the infusion thus obtained is actually acid to litmus paper. This curious circumstance is explained by the fact announced by Liebig, that although the blood in the vessels of the muscle is alkaline, from the tribasic phosphate of soda, yet the proper fluids or secretions of the tissues exterior to the capillaries are acid, from the presence of free phosphoric and latic acids. Thus in every mass of muscle we have myriads of electric currents, arising from the mutual reaction of an acid fluid exterior to the vessels on their alkaline contents. . . . . This view of Liebig on the condition of the fluid of muscles, curiously helps in explaining the presence of electricity in them announced by Matteucci. We have thus two sources of the electricity of muscles—the effects of metamorphosis of effete fibres on the one hand, and on the other the mutual reaction of two fluids in different chemical conditions. It is certainly curious thus to find a muscle, an organ long regarded as the motor apparatus of the bony levers of our frames, invested with new properties. Its agency in generating electricity can no longer be denied; and I hope by-and-by to render it probable that the seat of the generation of animal heat is also in the muscles.

It is evident, then, that numerous agents may be employed in the regulation of a large proportion of the electric fluid in the system, upon which its vitality depends, that have hitherto escaped the discriminating observations of the profession. Or, if those agents have been employed, the principles upon which they act have not been understood, and, consequently, their use has been only experimental. Certainly, the acids and alkaline fluids, so essential to the generation of this fluid, through the agency of the muscles, are within our control, and may be supplied, as necessity requires, in various forms. Doubtless, many of the remedies long in use, act upon the system as supplies, and consequently their use is still to be continued. Acids and alkaline substances constitute a large proportion of those medicinal agents so highly recommended in the materia medica, though, as heretofore administered, their "modus operandi" has not been understood. They constitute an important class of electropathic remedies, and are not to be superseded by mechanical electricity alone, as some are vain enough to suppose. And not only are such remedies known as medicines, to be recognized as belonging to this practice, but many others, which, doubtless, like them have their electrical influence. Those we have noticed, act and react through the various membranes of the body, as described; this requires that the surface of those membranes be properly preserved or prepared for their action; and this preparation may involve the use of solutions and washes of different properties, for the surface, and various compounds as internal remedies. What those remedies are to be, depends upon the judgment and observations of the practitioner. They may be found, perhaps, in both the mineral and vegetable classifications now extant, and perhaps, may with equal success, in different cases, be administered in alapathic or homæopathic doses. They may also be given in another form, as will appear from our third general division of remedies.

THIRD. *Mechanical and Soluble Remedies* consist in the use of instruments not yet described, galvanic, magneto-electric, etc., together with solutions of different qualities combined with the electricity thus excited. Though electricity, whether excited by the electrical machine, or galvanic battery, is supposed to be

the same, yet they modify, or give to it very different properties. Currents from the galvanic battery, as will be seen from their description, do not consist of electricity alone, but as it is modified by its association with other matter. Its effects, when thus induced, are essentially different from the effects of electricity when excited by friction, as in the instruments already described, and is varied in its modifications by different agents, as its use requires.

1. The galvanic battery, therefore, constitutes the first medical agent in this system of practice. This machine derives its name from *Galvani*, the discoverer of the principles of its action. Like all other instruments of this character, it has been carried through many improvements and modifications, adapted to the taste of the manufacturer, or the convenience of the experimenter. It is simply a combination of two metals, in such a manner as to be acted upon through an acid, its strength being in proportion to the amount of surface presented to the solution containing the acid. Formerly it was constructed of plates of metals, like zinc and silver, placed one upon the other alternately, with cloth or paper previously saturated with an acid between them. This form of battery is still in use by some, and is often referred to by different authors in this work.

A more convenient form for many purposes has recently been constructed, and is known as Smee's battery. It consists of one or more pairs of platinum and amalgamated zinc plates arranged in glass tumblers, and for convenience is usually placed in a case or box. The solution employed in this battery is sulphuric acid, diluted with from ten to fifteen parts of water. The wires, which serve as conductors of the electric fluid, are connected with the platinum and zinc, the platinum being the positive, and the zinc the negative pole. If the zinc plate be well amalgamated, it is not acted upon at all, except when the galvanic circuit is completed; hence, it is always ready for use. This battery may be extended from a single pair of plates to any limited number, one or the whole being used at once.

The Cylinder Battery is another instrument of much convenience. This consists of zinc and copper plates, of the cylinder form, the copper constituting a vessel of sufficient capacity to

contain the quantity of solution required for its use, into which is properly suspended a zinc cylinder. In this battery, the liquid employed, is a solution of the sulphate of copper, (blue vitriol) the action of which, according to Davis's Manual is as follows :—The zinc is oxidized by the oxygen of the water; the oxide combines with the acid of the salt, forming sulphate of zinc, which remains in solution; while the oxide of copper, which was previously combined with the acid, being set free, partly adheres to the surface of the zinc cylinder, or falls to the bottom of the solution as a black powder, and is partly reduced to metallic copper, which is precipitated on the surface of the copper cylinder, or falls to the bottom in fine grains. This reduction of the oxide to the metallic state takes place in the following manner. The water of the solution furnishes oxygen to the zinc, and thus enables it to combine with the acid; while the hydrogen, which is liberated, again forms water with the oxygen of the oxide of copper with which it comes in contact, leaving the metal free."

The principal advantage of a battery thus charged, is, the gas which is usually given off, is here avoided, as the hydrogen is mostly absorbed. In the galvanic battery, the quantity of electricity induced depends upon the size of the plates, while the intensity depends upon the number employed. For medical purposes, this distinction is essential, as quantity without intensity is often productive of much the most favorable results, and vice versa. Direct currents from the battery, without any other modification than the variation of the plates suggested, have a powerful influence in changing the vital functions. Their action is directly upon the organized fluids essential to life; hence, it affects the vital condition of the blood, influences nutrition, changes the tone of the secreting organs, decomposes calculus, etc. Applied through acid and alkaline substances, used as washes upon the surface, they also decompose these atoms, and diffuse their properties through the system. In testing the efficacy of electropathic remedies, let this form of administering electricity be tried, before the practice is abandoned.

2. A very convenient method of modulating the currents from the battery, is found in the *electro-magnetic apparatus*. Indeed,

so very astonishing are the effects of these machines in cases of different diseases, that many have thought they afford all the variations necessary. Properly constructed, they are certainly possessed of great advantages, and, judiciously employed, they are capable of accomplishing much in the treatment of certain classes of diseases, but other remedies are found to be equally as successful in other classes. Those in common use in families, and which, at present, practitioners employ in their practice, may be thus described. They consist of two concentric helices of wire, into the axis of which a rod of soft iron or a number of wires is passed. The currents are interrupted by the vibrating electrotome, which consist of an electro-magnet of the U form, enclosed in a helix of several layers of coils, above which is a straight armature fixed to a spring, and supported above the poles of the magnet so as to be permitted to vibrate, and the whole is secured upon the stand. "When the battery is applied, the current traverses in succession the coarse wire helix and the coil of the electrotome. The electro-magnet is instantly charged, and attracts its armature," which depresses the spring, and separates a little platinum disc upon it, from a point of the same metal above. This breaks the current at each vibration, and gives a rapid succession of shocks, to be experienced by taking hold the handles. Another method of breaking the current in this instrument, is by taking one of the battery wires from the screw-cup, and drawing it over a rasp upon the top of the helix.

The most convenient and efficient instrument in use, of this description, was constructed by the author, in 1847, and has since been constantly employed by him in effecting those cures which have so much distinguished his practice. The battery is of zinc and copper of *cubic form*, and with the helices and armature, is nicely fitted to portable fancy-wood cases.

Instruments of this class are especially adapted to the treatment of those diseases which result from an enfeebled state of the nerves, either of the system generally, or locally. When the succession of shocks given by the vibrating armature attached to this instrument, are passed properly upon a nerve, they exercise a powerfully stimulating influence, and this gives

to the organ or part supported by that nerve, an increased energy, which is often by a single application rendered permanent. It may be so applied from the great nervous centres of the body, through their ramifications, to the extremities, as to strengthen the whole nervous system, regulating the circulation, assisting digestion, etc.

For these different purposes different modes of application are to be observed, and different conductors or *directors* to be employed. From his extensive observation, however, the author has found no better method for applying this current, than through the the hand of the operator, especially, when the current indicated, is to be mild or of but little intensity.

SURGICAL ELECTROPATHY.

This division of our subject has, as yet, received but a small share of the attention it evidently deserves. Most of those cases in which it has been attempted, are from abroad; consequently, our remarks upon the subject are derived principally from foreign avthors.

1. ELECTRO-PUNCTURE. A paper was introduced at the French Academy of Sciences, on the 16th of January, 1843, by Dr. Shuster, says the Lond. and Edin. M. J. of M. S., June, 1844, in which he presented the following conclusions:

1. Electricity is useful as a therapeutic agent, only when introduced into the substance of the affected organ by means of acupuncture.

2. Galvanic electricity and the electro-magnetic fluid, when employed by acupuncture, constitute at once the most powerful and inoffensive medicinal agent which we possess.

3. The affections for the cure of which electro-puncture may be employed with success, are—First, hydrocele, ascites (idiopathic or symptomatic of curable lesions), hydro-thorax, and articular dropsies. Its use may be extended to chronic hydrocephalus, dropsy of the pericardium, and the greater part of dropsical effusions. Second, lissomatous, steatomatous, atheromatous, melicerous, serous, and synovial cysts. Third, congestions and indurations, chiefly those of the lymphatic glands, of

the testicles and epididymis, indurations of the cellular tissues, in the neighborhood of certain kinds of ulcers, and in the walls of pistulous passages, certain indolent tumefactions: and there would be nothing irrational in attacking cancerous affections in the same way. Fourth, goitre. Fifth, varicose dilatations, especially when the electro-puncture can be aided by rest and compression. The author does not despair to apply with advantage this treatment to aneurisms and erectile tumors. Sixth, chronic rheumatisms, neuralgia, and certain nervous diseases. Seventh paralytic affections in general, but especially those of the retina (*amaurosis asthenique*) and of the muscles of the voice (*mutismas paralytique*)

4. Electro--puncture applied to the treatment of diseases, acts in several ways, viz:—First as a direct stimulant of sensible contractility and absorption. Second, by causing small eschars, thus, as it were, cauterizing and destroying in detail a portion of the tumor. (The *cauterization* galvanique, or *sous cutanee* of the author.) Third. by decomposing the aqueous portion of tumors. Fourth, by forming, at the will of the operator, minute openings for the exit of the fluid part of tumors. Fifth, by producing in the wall of the cyst or other cavity, such a degree of inflammation as will cause obliteration by adhesion, without giving rise to any inconvenience if the patient be kept under strict surveillance. Sixth, by coagulating the blood, and causing effusion of little masses of plastic lymph into the cellular tissue.

5. The success of electro-puncture depends on the method employed.

6. Electro-puncture properly applied, is in the majority of cases, with slight pain only, free from inconvenience and danger to the patient, and frequently accomplishes a cure when all other means have failed.

There is little doubt of the accuracy of the conclusions here arrived at, but other and more simple methods will often accomplish the same objects. Congestions and indurations are often removed by the different modes heretofore described. Neuralgia, rheumatism, tumors, cancerous affections, etc., in numerous cases which have come under our personal obser-

vation, have been readily cured by the more simple electropathic remedies. Yet there are doubtless cases, in which electro-puncture alone would prove effectual.

This mode of operating seems to have originated with N. Berlioy, in 1816, and was soon after introduced into the Hospital de la Pitié, with great success. It is also practised by others on the continent with the most favorable results. Becquerel says, "this method of applying electricity is the most efficacious of all those that have been employed, since it permits us to act directly on the diseased part." (See Braithewaite's Retrospect, Part XV.) The instruments to be employed in these operations, are the battery, of which Smee's described on page 28, is to be preferred, with *acupuncture needles*, to be made of gold and silver, and insulated, except at the point, by being varnished or coated with shellac. The needles may be made as fine as possible, and of sufficient length, then mounted by insulating handles, with some convenient method for uniting the battery wires. These needles are to be plunged at once into the part to be affected and in different cases, as in aneurismal tumors several are to be entered at once from different points, being so directed that their points do not unite, and currents passed upon them. Several cases will be cited in another place, where such operations have been made with success. Currents from the magneto-electric or electro-magnetic instruments are objectionable, as the shocks produce pain quite insufferable.

2. Galvanic Moxa.—Sensible and insensible.—M. Fabre Palaprat introduced another mode of operating in surgical electropathy, into the French Academy in Feburary, 1831. Fine platinum needles were connected with a battery of large plates, and the galvanic circuit completed "by thrusting the needles into the flesh, when they immediatly become incandescent, causing a pipe of destroyed tissue to seperate and fall out in a few days." As the platinum needles are in this operation to be ignited, without being connected save through the flesh, the battery current required, is one of much intensity. These operations are made in cases of tumors, arthritic inflammations, and various diseases of the tissues.

Another mode of operating, for similar purposes, is suggested by Dr. Golden Bird, in the London Medical Gazette, June, 1847. He first produces two blisters of small size, then covers one with zinc foil, and the other with silver, and connects the two by means of a wire. The whole is then covered with water dressing and oiled silk. In some forty-eight hours, the surface under the zinc plate usually becomes white, and an eschar appears. In four or five days this begins to supurate, and the plates are removed. This leaves a healthy sore, which, by poulticing, freely discharges pus. Operations of this kind may be found necessary in some cases, but when other and more simple forms of electrical treatment have been tried, few cases, it is believed, will remain uncured.

ELECTROPATHIC DIAGNOSIS, OR EXAMINATION OF DISEASES.

Of all the advantages to be derived from the use of electricity, none probably, surpasses that of its application in the diagnosis, or examination of diseases. However effectual it may be in their removal, it cannot be understandingly applied, until the condition of the system is ascertained in reference to the state of this agent, as well as the location and character of the disease. From what has been said of its office, physiologically, it is evident that in its change from health to sickness, the system undergoes a change electrically. That change may, or may not, be the cause of disease; the judicious practitioner, before he attempts to regulate the vital force, should know the condition in which it exists. This would seem to be the only safe point from which to proceed.

The nerves are admitted to be the medium through which the currents of electricity traverse the system, giving tone and action to the various muscles, organs, and tissues. With our improved instruments and directors, we are enabled to pass currents in any direction upon any nerve. Their effects when passed in different directions, have been presented. We may now ask, Are those effects the same when the system is diseased, as when in health? Do currents produce the same

sensations? And do the organs operated upon exhibit no change? If they do, may not those sensations and changes be indications of disease? And, by carefully noting them, may not the character, as well as location of disease be determined? It is admitted that much experience and observation are necessary, in the present state of the practice, to ensure success. But without these, the principles are the same. The circulation of the blood from the heart through the arteries, and its return through the veins, was as true before the theory was asserted by Harvy, as since; and is now equally true, whether the practitioner has had the experience necessary to detect all its variations, as indicated by the pulse, or not.

The experience of several years, and the observations taken from experiments upon more than *five thousand* individuals, have forced me to the conclusion, that electricity affords the only infallible test of disease! During this period, every nerve in the system has been operated upon, and the effects upon those of every temperament, and under almost every variety of disease noticed. Strangers have been selected by the public and presented for examination, and their diseases, only known to themselves, definitely pointed out. The idea of thus probing deep-seated organs, by the aid of so wonderful an agent, is truly calculated not only to awaken inquiry, but, when performed, to raise the highest admiration. To some of the indications of disease, furnished through this medium, with the effects of having noticed them, reference will here be given.

In the act of respiration, it is well known that the diaphragm, intercostal nerves, abdominal muscles, and all the respiratory system, are called into exercise as well as the lungs, and that the chest requires expansion and contraction corresponding to that of the lungs. Now, weakness or contraction of muscles, affecting the abdomen, or diaphragm, as well as neuralgic pains, or strictures of the chest, often causes a cough, and great difficulty in the act of breathing; perhaps as much so as inflammation of the trachea, or ulceration of the lungs. By leading to congestion, it may also lead to hemorrhage, and how shall we determine which organ is the seat of disease?

Certainly not by sounding with the stethescope, for if a disease in other parts cause difficulty in breathing, from whatever cause, the lungs will not be exercised aright. It is as necessary to examine other organs engaged in the same exercise, as to examine the lungs; and in accomplishing this, electricity is entirely successful. Numerous cases, where all the usual symptoms of consumption have appeared, have come under our observation, where the disease was confined entirely to the organs described.

A bricklayer came to me in June, 1847, apparently far gone with consumption; and not only was it his opinion, but the opinion of his friends and physician, that his death was not far distant. The diagnosis commenced at his lungs, with currents of electricity from the electro-magnetic machine; first, from the cervical vertebrae through forward to different points upon the chest, and then in a reversed order, without producing any unpleasant effect. Currents were then passed on the intercostals and diaphragm, with no other sensation than those usually experienced, which are sensations of contraction. After this, the muscles of the abdomen were operated upon, when it was found that those of the left side were peculiarly susceptible. Indeed, the least intensity of the current was productive of pain, and, if continued for but few seconds, would produce convulsions and fainting. This was pronounced the seat of disease; and in proof that the decision was correct, it is only necessary to state, that with *six operations*, of twenty minutes each, the patient was *cured* and has followed his occupation to the present writing, (February, 1849.) Had his disease been consumption, as it was supposed to be at the commencement, no such results would have followed.

In diseases of the liver, stomach, or kidneys, similar mistakes, in judging from the usual symptoms, often occur. Let electrical currents be passed upon the nerves connecting with the organ where disease is apprehended, and if it be the seat of disease, a pain peculiar to the organ is experienced. That pain will be acute, if the disease be inflammatory; if weakness only, the sensation will be that of a spasm, etc.

The experienced and skilful operator will notice similar results in the most delicate nerve in the system. Diseases of the eye or ear are determined by the same process. So are spinal diseases, and the immediate seat of neuralgia, or rheumatism, etc.

No one can have witnessed the most trifling experiment with electricity, upon different individuals, without having been struck with their remarkably different capacity to bear its action upon their systems. Those whose systems are weak and enfeebled, often bear much stronger currents than the apparently more robust. I have seen misses, with chlorosis, so weak and feeble as to be scarcely susceptible of the least exercise, who were able to receive a full shock from an electrical battery of twelve jars! The same shock would move the muscles of a corpse quite as much as it would them. In this disease more than in any other with which I am acquainted, there is an absence of vital energy, and it is here referred to only on account of the peculiar state of the system electrically.

To make an electropathic diagnosis, the different states of the system generally, is the first thing to be observed. Secondly, the susceptibility of different parts to the electric fluid must be noticed; for in health some parts are more susceptible than others. And, third, the different effects upon different parts when in a state of disease. To ascertain all these differences requires an observation as extensive as the different conditions of our bodies. And in the present state of the science, the qualification necessary for the practice is experience.

GENERAL CLASSIFICATION OF DISEASES.

1. Electro-Negative State of the System.—In noticing the various diseases of the system, as explained upon principles of electricity, an electro-negative state is the first that claims attention. As the term implies, this state signifies a deficiency of electric fluid, and is opposite to the electro-positive, or healthy condition. This deficiency is marked by a corresponding absence of vital force, and the individual is

capable of but little endurance. Bodily exercise produces general lassitude, and excitement, which is only temporary, leaves the spirits depressed, and the body feeble. When the mind is exercised, the vital force, being minimum, is exhausted upon the brain, the functions of other organs are but feebly performed, and numerous local diseases are the result. So, too, when other organs are specially exercised, the small supply of vital force possessed by the system, is expended upon the organ more particularly employed, and others are enfeebled and deranged. The vital action of the nerves being feeble, leaves them peculiarly exposed, and a long list of nervous diseases follow; perhaps this action ceases entirely, and palsy or paralysis ensuses. The blood is not properly vitalized, and its circulation is impaired. Perhaps it is urged upon organs enfeebled, producing congestion, and perhaps hemorrhage. Many such effects follow in their train, and are not to be removed, till the prime cause is understood and the necessary remedies applied.

2. Neuroses.—This is the second class of diseases in Cullen's nosology, and, according to Hooper, comprehends affections of sense and motion disturbed, without either idiopathic pyrexia, or topical diseases. As has been implied, this class of diseases belongs to the nervous system, sense and motion depending upon the performance of their office, and these again upon the vital force of the system. Its subdivisions are numerous, and extend from the two extremes, of the most acute pain, to the entire loss of sensation, and from the most extreme case of chorea, or constant motion, to that of entire inability to move, or palsy. They are all within the immediate reach of electropathic remedies, and will be particularly described in another chapter upon their treatment.

3. Congestions.—From two apparent causes, the blood and other fluids are sometimes collected in superabundance within their vessels, producing distension, and often the most fatal results. This, (from congeio, to amass) is called congestion. First, this state of the fluids may be traced to a derangement in the decompositions of the body, by which the fluid masses are not properly secreted, or to an inability

of the secretions to receive such fluids; or, secondly, by the fluids being urged upon organs unable, through deficiency of vital energy, to excrete or eject them when thus received. From either cause electricity is an efficient, safe, and immediate remedy. Numerous cases will be cited in their proper order, in proof of this.

4. Muscular Contraction.—It is not alone to the limbs, the walls, or parietes of the body, that we are to look for injuries received from the contraction of muscles. The functions of internal organs are impaired, even by the contraction of external muscles, while internal contraction is as liable to take place as external. Contraction of the muscles of the chest, variously induced, is often the chief cause of diseased lungs: while that of the parietes, and the included organs of the abdomen, produce diseases of very different character. Deafness and various cerebral diseases, have their origin, in many cases, in the contraction of the muscles of the neck. Organs are by such means often misplaced, joints dislocated, and the most severe pains produced. Every muscle in the system is within the influence of mechanical electricity. Interrupted currents will cause them to vibrate, and in the most obstinate cases, the contraction is often removed by a single operation of a few minutes.

5. Epidemic or Malarious—It is well known that this extensive class of diseases prevails more than all others, breaking out at particular seasons and in certain sections of country, in different forms, baffling the skill of the most experienced practitioners, and hurrying its thousands and tens of thousands to a premature grave.

Many eminent naturalists are agreed in tracing this class of diseases to electrical changes, and their effects upon the system. Among the most prominent authors who have presented their opinions upon this point, are Sir James Murray, M. Pallas, and Dr. Priestley. Numerous experiments, in *malarious* districts, have led to conclusions as expressed by the first; "that the exciting cause of epidemics, which is called *malaria*, is not 'bad air' at all, as the name implies.

2d. That marsh miasms, gases, or effluvia of vegeto-animal

matters or putrid emanations, are not, as is commonly supposed, the exciting causes of agues or other diseases called malarious.

3d. That in denying the usual doctrine of marsh miasmata I do not deny that general 'malarious' ailments proceed from terrestrial, paludial, or atmospheric emanations of active, dangerous, and subtile qualities.

4th. But I consider these noxious emanations are disturbed *electro-galvanic currents* and accumulations, sometimes positive, somtimes negative, causing a want of electrical equilibrium in human bodies."

It must be admitted that great electrical changes take place during the seasons of *epidemics*, and in those districts where they generally prevail. As it is known that this agent is intimately allied to vitality, there is certainly much propriety in looking to its changes for some of those disturbances of the vital functions, not otherwise accounted for, which are proving so fatal.

6. Inflammation.—This disease may be induced by electricity, or removed by it, as it is differently employed. Drawn in scintillations, or sparks, from the surface, it is highly irritating, and if persevered in, produces for a period a high state of inflammation. This often exerts a sedative influence upon other parts, on the principle of a counter irritant. If passed from a galvanic battery of many plates, through very delicate organs, for any considerable time, it also inflames them. Passed in gentle currents, and for a limited time, with proper intervals between the operations, it allays the inflammation, whether acute or chronic. I have known it to cure the most highly inflamed eyes, with even a few operations; while in other cases, it has cured inflammation of the throat, where the patient had suffered for years. Its special applications in such cases, will be described as we proceed.

As the result of microscopic observations, Dr. W. Philip represents the condition of the capillaries in inflammation, as similar to congestion, that is, of debility and distension, while the arterial action is increased. The action of electricity upon the capillaries in such cases, is that of a stimulus, by which

inflammation is removed. Inflammation from bruises is almost instantly removed, even though the part be much swollen, by passing gentle currents from the electro-magnetic instrument through the inflamed part. Whether this be the result of restoring tone to the capillaries, or of vitalizing anew the blood there concentrated, is perhaps a subject as yet of inquiry.

7. Uterine Diseases.—In this class of diseases we include those peculiar to the female, whether resulting from the uterus directly, or from organs intimately connected in the generative process. The functions of these organs are peculiarly under the influence of electricity, and by the different modes in which it may be employed, the greatest possible advantages may be derived from its use. As diseases of this character require the most judicious treatment, and as this agent produces effects peculiar to the method in which it is employed, the utmost care is requisite in its application. In restoring the menstrual flux in cases of obstructions, its effects are surprisingly perceived: so much so, that Dr. G. Bird declares that in it we have "the only direct emmenagogue which the experience of our profession has furnished: I do not think I I have ever known it fail to excite menstruation, where the uterus was capable of performing this office." (See Medical Gazette, June 18, 1847.) In uterine weakness, which often gives rise to dysmenorrhœa and other disastrous consequences, it is also employed with equal success. In prostration in accouchement, its use in arousing the energies, when strength is most needed, is truly surprising. Indeed, it is firmly believed that at least one half the pain consequent at such times, may be avoided by its judicious use. Hemorrhages are also arrested by its timely application, even when all other means have failed. Several cases will be cited in another place, in which the life of the patient was saved after all the usual remedies had failed, by the timely application of this agent. In no case with which we are acquainted, has its use been attended with unfavorable results, and we can see no possible objection to substituting its proper application for those remedies which too often prove worse than useless.

Many diseases not included in the classification here given,

have been successfully treated by electricity, to which special attention will be given in the following sections of this work; among which are cases of tumefaction, rheumatic and scrofulous swellings, suspended animation, etc., etc. In these, and in all cases where electricity is to be employed in the treatment of diseases, the success depends upon the *manner* in which the agent is applied. As a medical agent, it is entirely at the disposal of the practitioner, and with the remedies we have described, he may control it at his pleasure. Nor is it the less worthy of confidence, because it may be misapplied, or employed in so many different ways, for different purposes. On the contrary, it is more entitled to our consideration, from this single fact. It is only necessary to direct our attention to its various effects, and, by observing them, to learn its use.

ELECTROPATHIC PRACTICE—SPECIAL TREATMENT OF DISEASES.

From what has been said in the preceding divisions of our subject, it must be apparent, that the success attending the use of the remedies described, depends upon the practitioner's knowledge of those general laws which govern the agent he is to employ, together with his judgment, skill, and experience in the practice. Observation has taught us, that those practitioners who select a single branch of practice, thoroughly acquainting themselves with its principles, and adhering to them, render themselves more useful in the profession. In the present state of the profession, this must prove true in the practice of electropathy. The practice is new, its remedies numerous, and their effects various. No doubt new and important ones will be suggested, worthy of use, while worthless ones will be also presented, which the success of the practice must require to be rejected. To render the practice, therefore, what it should be, and what it must be, to prove successful, requires the whole attention of those who engage in it. To combine it with all the various branches

now connected with the usual practice, would be but adding to an evil already admitted to be such, and as the result, to deprive the sufferer of what might otherwise be to him the protection of health, and the preservation of life.

With the experience and observation of many years, it is not presumed that the best means of treating all diseases is now understood; and, in the description of cases which may follow, it will doubtless be seen that a difference of opinion exists in regard to their treatment. Nor is it surprising that it should be so. Different individuals, among different nations, have engaged in experimental observations upon the subject, with but little correspondence, or even fellowship in their researches, and the marvel is rather that they have arrived so nearly at the same conclusions.

The cases selected for reference, will not be from our own notes alone, though we may have treated similar cases with similar results; but from as great a variety of authors as possible, and, when convenient, in their own language. Nor shall we observe much regularity in their classification, reminding the reader that an index will accompany each number of the Guide, by the aid of which he will be enabled to turn, at once, to any subject treated of.

Aphonia. Hooper defines this disease to be a "suppression of the voice, without either syncope or coma," and divides it into three classes. 1st, *aphonia gutturalis*, when proceeding from a tumor of the fauces, or about the glottis; 2nd. *aphonia trachealis*, when from the diseased state of the trachea; 3rd, *aphonia atonica*, when from paralysis, or want of nervous energy. When from either cause here named, aphonia comes within the reach of electropathic remedies, only requiring such treatment as is adapted to its peculiar form. When from tumefaction, or swellings, as in the first case, currents from the battery passed directly through, and in reversed order, are usually found sufficient to disperse the enlargement, and restore healthy action. This may be done by placing one of the directors from Smee's battery, or any other of similar effect, upon one side of the tumor, and the other opposite, changing the order of the currents, at intervals of a few

minutes. Currents from the electro-magnetic machine are also found effectual, when passed in the same order. In more obstinate cases, it may be found necessary to employ much stronger currents, than in others; and in extreme cases, electro-puncture may be found necessary. But milder remedies are usually sufficient.

When from diseases of the trachea, pass gentle electro-magnetic currents, through the diseased part, by placing one conductor over the nape of the neck, and by making the hand of the operator the other, passing it over the part diseased, as in gentle manipulations. In the earlier stages of this disease, I have often found one or two operations, of fifteen minutes each, to effect a permanent cure. Hoarseness, from usual causes, like colds, etc., is readily removed by such applications. Vocalists, having lost the power of voice, are immediately restored by the same process; indeed, their voices are always stronger and more distinct after its use. I have known those scarcely able to articulate a sound, fully restored to that degree necessary for a full evening's exercise, by a single operation. Public speakers are similarly affected.

Aphonia atonica, or from a loss of nervous energy, or paralysis, requires interrupted currents from the vibrating electro-magnetic machine, passed from the centre of the nerves affected, to their termination, and that the operations be repeated at proper intervals, often for a considerable time. Such cases have been cured by shocks from the Leyden jar, and also, by direct shocks from a galvanic battery of immense power. Professor Loomis, of Waterville, Maine, described to me a case, which he cured by the use of the jar, where the voice had been for a long time entirely suppressed; but it required many weeks to effect the cure. A case in which the latter treatment was adopted with success, is deseribed in the *London Lancet*, May 27th, 1843:

"Theodore Mandurick, a Dalmatian, twenty-four years of age, of sanguine temperament and robust constitution, and who had usually enjoyed good health, killed one of his countrymen in a quarrel, for which offence he was incarcerated in the prison at Icardona. Three days afterwards he was attacked

by a violent fit of epilepsy, followed by entire loss of voice, to restore which, external local and general bleedings, and antiphlogistic measures of all kinds were employed, without effect. In a few months he was removed to the central prison of Zára, where he was examined by the medical staff. The tongue was somewhat enlarged, and preturnaturally reddened, though dry, and the blood-vessels around its base were much distended. The sense of taste was uninjured, but the movements of the tongue and of the larynx were performed with difficulty. Leeches were now applied to the sides of the tongue; tartarized antimony, in both large and small doses, and drastic purgatives were employed, and a tartar-emetic plaster was placed over the larynx; but all these means failed to restore a healthy action to the parts adjacent, and Mandurick was still compelled to keep his mouth partially open to maintain respiration, a function only performed by short and difficult inspirations. At length, about sixteen months after the attack, the voltaic pile was thought of, and a battery of fifty pair of plates was employed. The positive pole was placed over the cervical vertebræ, and the negative upon parts affected. On the first day two hundred shocks were given, and on the second three hundred, but no perceptible effect followed. Two days were suffered to elapse, and a battery of seventy pair of plates was then used, with which about three hundred shocks were given. The patient was found acutely sensitive to the action of electricity, and a lapse of five days was permitted to intervene before its fourth application, which consisted of four hundred shocks with the latter-named instrument. Whether these were administered too precipitately, or whether his system had become more excitable by galvanism, the patient, after this last application, became much agitated, and subsequently fainted for a short time. Next day he suffered intense headache, his face was flushed, eyes lustrous, pulse full and strong, from which state he was relieved by bleeding. But he now, for the first time, gave utterance to hoarse sounds. After six more days, the battery of fifty pairs was again employed, and three hundred shocks given. The same treatment was repeated every two or three days, and

then, at similar intervals, four hundred shocks were given with the seventy-pair battery. The voice, meanwhile, and the motive powers of the tongue and larynx, gradually returned to their normal condition, and after the twelfth application the patient had completely recovered. The deduction drawn by the surgeon who has reported the case, is, that no nervous affection whatever should be regarded as incurable, till electricity in some form has been tried and found to fail."

A very remarkable case is quoted from the *Gaz. Med. de Paris*, of a cure by electro-puncture, effected by M. Camino. The subject was affected by a fright in 1813, which resulted in the loss of sensation and movement. By degrees she recovered the use of her legs, but not of her arms or head. From the moment of her fright she had been unable to articulate a word. Her tongue was atrophied, and remained immovable between her teeth.

"On the 21st of May, 1836, a metalic needle was introduced into the neck, directing its point towards the occipital branch of the first cervical nerve; then it was brought into connection with the zinc pole of a voltaic pile; and holding the tongue, elevated and stretched out on a sheet of the same metal, the circle was closed by presenting to that organ the knob of a brass director. The patient showed, by quickly drawing herself away, that she had felt the shock. The experiment was repeated, and the effect was more marked than before. At the end of three other shocks the patient exclaimed—'Oh Dieu!' and could answer some questions in an intelligent manner, although with some difficulty. She also became able to move her tongue from side to side.

"The next day, after some shocks given in the same manner, M. Camino commenced varying the points of contact, and giving the electricity different directions. The patient showed more and more sensibility, and the faculty of articulation followed the gradual return of the movements of the tongue. Two days of repose employed in exercising the organ, sensibly rendered the faculty of pronouncing and articulating sounds easier and more accurate. In a short time she was able to speak as before, and acquitted herself so well, and with so

much ardor, that she seemed, says the author, to wish to make up as quickly as possible for the time lost in inaction and silence. Every three or four days she came back to receive four or five shocks with the pile, not being able, as she said, to bear more. On the 10th of June, she complained, without obvious cause, of pain in the head, and a general feeling of weight, an ailment which was dissipated by a bleeding. After some more sittings, not only was her speech recovered, but also the activity of the other paralyzed parts, which became quite fit to exercise their functions." (See Dublin Medical Press, March 1st, 1848, page 133.)

2. PARALYSIS. This is a genus of disease in the class *Neuroses*, and order *Comata*, of Cullen, known by the loss of the power of motion, either voluntary or involuntary, with which certain parts of the body are affected, often attended with drowsiness. The species are—1st, *Paralysis partialis*, partial, or palsy of some particular muscle: 2d, *Paralysis hemiplegia*, or palsy of one side longitudinally: 3d, *Paralysis paraplegia*, palsy of one-half of the body, taken transversely, as both legs and thighs; 4th, *Paralysis venemata*, from the sedative effects of poisons. Paralysis is also often symptomatic of several diseases. It arises from attacks of apoplexy, from over distension and effusion, from excitement, as fear, frights, etc., and from anything that exhausts, or obstructs the nervous fluid, or electrical action of the system. Injuries, blows, neuralgic pains, and scrofulous affections, tumors, etc., have this effect. It has been usually confined to the loss of voluntary motion, but we see no reason why the same causes may not equally affect the involuntary functions of the system. If the loss of nervous power in a nerve through which voluntary motion is performed, deprives the organ it supports of action, surely, there is no reason why the weakness or loss of action in a nerve supporting the involuntary functions of an organ, may not deprive it of its action! Though the idea has not been dwelt upon, it seems that this may prove to be the real cause of many of those sudden deaths, reported from diseases of the heart. The suggestion is entitled to inquiry. If it should appear that every function of the system is performed

through the energies or power of the nerves, as they are so directly within the control of electricity, the advantages of a practice founded upon its principles, will appear more and more important.

In all the varieties of this disease, so far as has been tested, electricity has been remarkably efficient. Practitioners generally have borne witness to its usefulness in some forms of the disease, while others have placed it among its only curative remedies. Dr. Bird says, "It is the actual curative agent in some of the forms of this disease; that in all it expedites the cure, and in none is it injurious." Of course, much depends on the manner in which it is employed. The nerves are the medium of communication. In no particular do the systems of individuals differ more, than in the condition of their nervous power. Hence, it would be impossible to give rules, as to the strength of the currents to be passed, in all cases, even upon the same nerve; and more difficult still, if the thing could be, to determine the intensity of those currents required to be passed upon different nerves in the same person, as different nerves in the same individual bear much more intense currents than others when in health.

But notwithstanding these difficulties, there are rules in the application of electricity, to be carefully borne in mind in the treatment of this disease. They have been already intimated, but in their direct application it may be well to be more specific.

First, ascertain the seat of disease, and the strength of the current to be applied, by employing the electro-magnetic machine, which, as has been said, is preferable in making the diagnosis. This may be accomplished by passing currents in different directions through the part examined. These currents should at first be as light as possible, and increased in strength, until the condition of every nerve where disease is apprehended, be determined. Second, never pass a current upon any nerve, but for a few minutes at a time. Experience has established the fact that this is calculated to destroy the nerve, or to paralyze it. It is always preferable, in using the electro-magnetic machine, that one of the directors

through which the communication is made, be kept in motion, that is, in making manipulations over the part affected. Third, pass inverse currents. "We may, in fact, admit," says Matteucci, "that in some cases of paralysis, the nerves of the affected limb are in a condition similar to that produced by the continued passage of an electric current. We have seen, that to restore the excitability of a nerve which had been deprived of it by an electric current, it is requisite to conduct the current in the opposite direction. Hence, to cure paralysis, the current should be passed in a direction contrary to that which has produced it. In a paralysis of motion, the inverse current should be employed; while, on the contrary, in a paralysis of sensation, the direct current should be used. In a case of complete paralysis (that is, of both motion and sensation,) there is no reason to induce us to prefer one current to the other."

By passing a current too long in one direction, we are liable to augment the disease we might design to cure. Hence, the more intense the current, the shorter should be its duration; and as we have seen that the passage of the electric current in the nerves, repeated at short intervals of time, considerably enfeebles their sensibility, when continued for a long time, we must take care and not pass from one extreme to another. Theory teaches us to apply the electric current of an intensity which should vary with the degree of the malady, and continue its passage for two or three minutes, at intervals of some seconds. (See Medical Chirurgical Review, April, 1845, p. 320.)

Fourth, adapt the strength of the current to the organ operated upon, and the condition of the patient. Both theory and practice teach us that some cases require the use of very strong currents, while others are equally affected by the slightest we are able to employ. The judgment and experience of the practitioner must here be called in question. Dr. Grapengiesser found it necessary, in the case of a young lady who was entirely deprived of her senses by "sorrow and vexation," and whose right side, aftertheir return, remained paralytic, for the recovery of her arm, which was

bent by the spasmodic contractions of the muscles, "until her fingers were so contracted that no power was able to open her hand," to apply *the full force of a battery of one hundred pair*. Whenever this current was applied, the stiffness of the elbow and fingers, to use the author's words, "disappeared in a moment, and she could with ease stretch her fingers and arm." As paralytic affections are numerous, assuming many forms, and requiring different treatment, it is thought best to cite a variety of cases, with the manner in which they are to be treated. The general principles presented, however, will be observed in them all.

Paraplegia. Dr. Constantine James gives the details of an extreme case of paraplegia, in the *Gazette Medicale de Paris*, of 1848, in which electricity proved entirely successful. The patient was a girl of seventeen, who was first injured by falling at full length while walking. From this she suffered pain in the knees and subsequent weakness. The usual remedies, local and general, were resorted to without relief. She was then placed under the water treatment at Néris, where she remained for six months. From this, complete paraplegia followed, and on her return to Paris the most powerful treatment was resorted to, but with little benefit. After three years from the first accident, electro-magnetism was applied. The lower extremities were now much wasted away, and without assistance could not be raised from the bed.

The treatment was commenced with much care, being evidently resorted to as an experiment. The negative pole was brought in connection with the first lumbar vertebræ, while the positive was placed over the head of the tibia of each limb successively. Eight applications in this way, gave evidence of a decided improvement. Electro-puncture needles were then introduced into the middle and posterior part of the lumbar region, with which the negative pole was connected. Twenty of these operations enabled the patient to take some steps, with the aid of a cane. After this, needles were inserted in each limb a little below the head of the tibia. The treatment was wholly suspended during the menstrual periods, and at other times, by reason of nervous excitement, and yet

in four months the patient was entirely restored. She has since married, and remains permanently well.

Much more time was required in this case, than would have been, had the operator been experienced in this branch of practice; but, under the circumstances, the treatment proved all that could have been desired. It would seem, however, that the inconvenience of electro-puncture might have been avoided. The first eight operations gave evident relief: and if these, which were made without this process, had been continued, doubtless they would have proved equally as successful. In my own practice, I have adopted in such cases, and with great success, the method of placing the positive pole in connection with the feet, by means of the metallic slipper, while with the negative attached to a moistened sponge, I have made manipulations across the lumbar region and down the limbs. The first two or three operations made in this way, usually afford relief, and seldom do those cases in which I have employed the treatment require more than three or four weeks for a cure.

Another case of paraplegia is reported by Dr. Turtelli, in the *Revue Med.*, May. 1825. This was induced by cerebral inflammation. After other remedies had failed, shocks from a battery of thirty pair of plates were passed from the hand to the foot of the patient. This being too intense, caused headache, thirst, and anxiety, when the number of plates was reduced to twenty. From this some thirty shocks were given at a time. Improvement was manifest from the first, and by the seventh the cure was complete.

In all cases of this kind I have found the electro-magnetic currents all that were required. With currents passed for from fifteen to twenty minutes in a reversed order, patients have often been enabled to use the limb with ease, even from the first operation, which they had been unable to control before for years. In all cases the current should be gentle at first, and increased in intensity as the patient can bear.

Hemiplegia. Some thirty-five cases of this disease have come under my observation within the past four years, in which electropathic remedies have been tested. Shocks from

the Leyden jar have, in some cases, proved of service, but in nearly all, the electro-magnetic currents have proved effectual. Some have derived advantage from sparks drawn from the spine, while insulated, but this method of operating is comparatively useless in such cases.

In October, 1847, a gentleman was put under my treatment, who for two years previous had been laboring under this disease in its worst form. For some six months from his first attack, which was from an injury to the spine by a fall, he had been unable to control any of the muscles on his right side. His mouth was drawn round on one side by the contraction of the portio dura, and the senses of taste and smell nearly lost. By degrees, he had so far recovered before he came under my treatment, that he could use his foot a little, but his arm hung useless by his side, his fingers were clinched, and the whole side had perished away. By electric currents passed through the arm from the electro-magnet instrument, the negative pole being in connection with his hand, and the positive employed in manipulations from the cervical vertebrae across the shoulder and down the arm, in three days he was enabled to take his pencil and write his name. Similar currents were passed through his limb, and his side generally for some five weeks, each operation occupying in all a half an hour, when he was quite restored.

Cases of this disease have also been very successfully treated by other practitioners. One of considerable importance is reported in the *Revue Med.*, Nov., 1834, of Madame B., where the hemiplegia was the result of apoplexy. Speech difficult, taste and hearing impaired, saliva escaping from her mouth, constipation obstinate, bladder distended, cramps in the paralyzed limb frequent. At length œdema throughout the left side. From the first operation, Madame B. was enabled to stand, to stoop and rise again, and on the second day the œdema diminished, and perspiration was felt upon the left side. The hearing was improved, and her features became more regular. With twenty applications she had quite recovered, when she left Bordeaux, and M. Bermond, the operator, presents it as his opinion, that two weeks longer would have removed every trace of the disease.

Dropped Hands. Five cases of this disease have been under treatment the past year. Two were laborers. The first had been bled the day previous to the attack, and to use his own words, when he awoke in the morning, he found he could not raise his hand "at all at all." Electro-magnetic currents of considerable intensity were passed and reversed through the hand and arm from the spine. The first operation gave much relief, and the third effected a cure. The second was treated in the same way; and with two operations, the Irishman went about his labor as before. Other cases have required from five to ten operations for a full cure.

Dr. Golden Bird reports eleven cases, mostly connected with colica pictonum, in which the treatment was sparks drawn from the cervical part of the spine, while the patient was charged upon the insulating stool. Medicines were also given in connection with the other treatment, adapted to the associated complaints of the patients. Five out of the eleven were cured, three were relieved, one improved, and two were not benefitted. One was from lead colic; extensors of both hands paralyzed, with amaurosis. Paralysis cured by four months' treatment, but the amaurosis remained. Second was paralysis of extensors; in one month was able to resume labor. Treatment, gentle shocks, from the spine down the arm. Third, total paralysis of extensors; the right hand for three years, the left for one. Treatment, first, shocks down the arm, on each alternate day, for twenty days, without success. Second, sparks taken from the spine thrice a week, for six or eight minutes; in two weeks able to resume labor. It is the opinion of Dr. Bird, that sparks drawn from the spine, in chronic cases of this disease, are more effectual than shocks down the arm; and though we have not in cases brought within our observation found it necessary to adopt that mode of treatment, we are satisfied that the conclusion is correct.

Rheumatic Paralysis. Under this term, Dr. Bird includes all cases where the palsy follows the application of cold, independent of any evidence of spinal lesion. Such cases are very common, and are usually attended with peripheral pains of a rheumatic character, sometimes even with redness and tume-

faction of the joints, which, however, are always evanescent. There is, indeed, but little difference between this form of disease and rheumatism. In my practice for the past five years, I have treated a large number of patients with this disease, and seldom have the remedies employed failed of giving relief. In June, 1848, a man was brought into my office, unable even to move his limbs at all, suffering with what his physician had called rheumatism in an aggravated form. His treatment was electro-magnetic currents passed from the lumbar vertebræ through his limbs, for half an hour. After the first operation, he arose and walked to his carriage with ease; and without even the second operation, he continued to gain, and is now well. A lady who had suffered much from pains in her arms, supposed to be rheumatic, called on me in 1847, and was then unable to raise her hands to her face, from paralysis. Two operations of fifteen minutes fully restored her. Capt. B. keeper of a hotel, in Saco, Maine, had not put his hands to his face for eighteen months, nor written his name. Currents passed from the cervical vertebræ, through his arms, for twenty minutes, restored them fully to their use. Such results have now become every day occurrences; but lest it seem too egotistic to confine my remarks to my own practice, cases reported by others will be cited.

Dr. Bird reports a case under the care of Dr. Addison, as follows:—R. E. admitted September 27th. Ten months previous, while off the coast of Africa, the patient was the subject of fever, for which cold affusion was copiously used; to this he attributes the paralysis of the right forearm, and both hands, which appeared when convalescing from the disease. Is quite unable to move the paralyzed limbs; health otherwise good. Sept. 27th, sparks to be drawn thrice a week from the spine and paralyzed muscles. Nov. 14th, has improved daily; and being now in possession of full power over the previously paralyzed limbs, he was presented cured.

J. Y., aged fifteen, admitted into the hospital in the middle of January, 1837, stated that sixteen months back he suffered from pain and swelling at the upper part of the neck; this was followed in two months by loss of power over the right

arm, for which he continued under treatment during nine months. without deriving any benefit, so far as power over the paralyzed limb was concerned. It was then determined to try the effects of electricity ; and in the middle of August, twelve shocks were ordered to be passed from the region of the cervical vertebræ to the fingers of the right hand, daily. Oct. 8th, has gradually improved, and has now considerable power over the affected limb. Oct. 26th, recovered completely the power of moving the arm, and was discharged cured.

W. E., aged thirty. This man had been employed in loading and unloading cargoes of coasting vessels at one of the wharves ; and a few weeks ago, whilst unpacking salmon, the cold water from the melting ice burst from one of the packages and drenched him completely. He took no notice of this, but on the following day the little finger of the right hand became numb ; this gradually increased, and in a week he lost all power over both his hands, sensation remaining unaffected. Oct. 19th, 1840, sparks to be drawn from the spine and the affected hands. Under this treatment he rapidly improved ; and after attending a few times, he became so much improved as to be able to return to his work.

The process of taking sparks from the part affected, so often referred to by Dr. Bird, with success, has been adopted in some cases under our treatment, in connection with electro-magnetic currents ; i. e., we have first taken out sparks by this process, and then followed with the passing of currents, and with success.

Facial Paralysis. From exposure to draughts of air, as by sitting near windows with broken panes of glass, or by half-open windows either in carriages or heated rooms, or by sleeping where currents of air pass directly over the face, the portio dura, and other nerves of the face, are often deprived of their vital energy, giving pain, sometimes rheumatic, and not unfrequently resulting in entire paralysis. In such cases, electricity proves itself peculiarly efficient ; and in the language of Dr. Bird, it scarcely matters what form of electricity is applied, so long as it is sufficiently effective to induce con-

traction of the paralyzed muscles under its influence. Weak shocks from a charged jar, the passage of a series of currents from an electro-magnetic machine, or the direct irritation produced by drawing a series of sparks from the cheek, when the patient is insulated and connected with the prime conductor of an electrical machine, seem to answer equally well.

In some fifteen cases, I have found the most effectual treatment to be, to pass the current from the electro-magnetic machine, through the cheek affected, from the hand of the operator. Let the positive pole be in connection with the hand of the patient, and while the negative is holden by the operator in one hand, let him employ the other in making manipulations over the part affected, with as strong a current as the patient can well bear. This process is simple, and very effectual.

In the *Revue Medicale*, of January, 1830, H. Mentault describes a case of this disease with which he had been afflicted. The portio dura on the right side of the face was paralyzed; active treatment, such as depletion, local irritants, etc., immediately resorted to, but without success. In a week the symptoms had become much aggravated, pronunciation and deglutition being almost impossible. Electrical treatment was then commenced by M. M. Sarbandiere and Pictionniere. The sparks, shocks, brush, and finally, galvano-puncture succeeded each other. Needles were passed into the face, and currents from a battery of thirty pair of plates transmitted, in the course of the facial nerve and its branches, for thirty minutes each time. By this process, relief was obtained at the second operation, and by the sixth, eleven days from the first, a full cure effected.

Dr. Bird cites several cases of this kind, (See Med. Gaz., Aug. 6th, 1847,) from which we select the following:—"A barrister, in full and influential practice, became the subject of paralysis of the portio dura on the left side, from exposing the cheek to a current of air from a broken window in a crowded court. He applied to me in a week or two afterwards, the paralysis continuing, and the distortion of the face hideous. As his general health was excellent, I ordered him to apply currents from the electro-magnetic machine, which was done, and in a fortnight all distortion vanished."

"A young gentleman, sixteen years of age, became paralyzed from the influence of a draught of cold air upon the cheek while asleep. I saw him two or three days afterwards; there was no local tenderness in the course of the portio dura, but the distortion was extreme. I requested his father, himself a zealous cultivator of physical science, to place him upon an insulated chair, and, connecting him with the electrical machine, to draw sparks from the affected side; this was regularly done daily and he rapidly recovered.

"An instance lately occurred to me in the person of a clergyman, who had suffered from paralysis of the seventh pair of nerves a dozen years previously, and the paralysis had never completely disappeared; the face when I saw him was not symmetrical, the saliva often flowed from the corner of the mouth, and his intonation was impaired. He set sedulously to work with the electro-magnetic current, and I saw him some months afterwards entirely restored."

Paralysis from Injuries. Of course, the cure, in such cases, depends upon the nature of the injury done. If the structure of a nerve has been injured, by a blow or otherwise, it could not be expected that electricity would effect a cure. But if the paralysis be the effect of a blow, or other violence, without any essential disorganization of the nervous fibres it will prove itself an effectual remedy. Or if it be from concussion, as it often is, electrical treatment will prove useful. In such cases, Dr. Bird prefers the use of electro-magnetic currents, from a *single current machine*, to be passed in the course of the *vis nervosa*, or, in other words, in the direction of the nervous ramifications.

A young mariner was brought to my office in July, 1848, who had, some five weeks previously, while at sea, fallen from the rigging of the vessel on which he was engaged, to the deck, striking upon his back. From the time of the accident to the day I first saw him, he had been unable either to assume the erect position, or to walk. Electricity was applied for some twenty-five minutes, from the electro-magnetic machine, the negative pole being connected with a moistened sponge, and placed under the coccyx, while the positive was passed from the cervical to the lumbar vertebræ and the connecting parts, by

manipulations. After the first operation he could stand erect, and from its being repeated some three or four days in succession, he was enabled to walk for miles.

Two cases are described by Dr. Bird; the first, a shoe-maker, aged fifty, fell with his left arm under him, from which complete paralysis of both motion and sensation ensued. June 27, three weeks after the accident, feeble shocks were given from the neck to the fingers. July 17, sufficiently restored to resume labor. The second was from a fall, in which the shoulder was the seat of the injury. Six weeks from the accident, sparks were ordered to be drawn from the shoulder, and in twenty days, by this process, the patient was so far restored as to cease to attend.

Hysterical Paralysis. Upon this subject, Dr. Bird says: "I feel a great difficulty in expressing an opinion regarding the remedial influence of electricity, in consequence of the nearly impracticable task of distinguishing between the mere assumption and the reality of the existing paralysis in hysterical women. It is really difficult to believe that girls and women, whose very means of living decently, much less the possession of the comforts of life, depend upon their being able to exert themselves, should simulate paralysis; and yet we know that such is too frequently the case. The morbid state of mind which predisposes to such impostures presents a curious enigma for solution. Admitting the existence of such cases of imposture and deception, we too often run the risk of becoming uncharitable, and to consider many forms of functional paralysis as purely simulative. It is not for me to enter into the interesting problems of the vagaries of such cases. I will content myself with pointing out the high importance of the electric shock, or interrupted current of an electro-magnetic machine in such cases. If the patient simulates paralysis (and, when she does, it much more usually is in the form of rigidity of a limb, than any other), she can seldom resist the pain and surprise of the shock, and the previously rigid limb will generally instantly move. On the other hand, in hysterical paralysis, where the affection, however excited at first, is now uninfluenced by the patient's will, there are few curative remedies so important as the electro-

magnetic current. I have seen a young woman, the subject of hysterical paraplegia for months, move the limbs and walk, although unsteadily, in an hour or two after the application of electricity; and very lately, another was in Guy's Hospital under my care with paralysis of the right arm, in which the same successful results occurred. In neither of these cases could I detect simulation; and not only was there no motive for it, but the interests and desires of the patients were opposed to it, for the paraplegic girl was prevented from becoming a wife by her paralysis, and the young woman with the palsied arm had an aged mother, to whom she appeared deeply attached, depending upon her exertions for her means of support."

In Guy's Hospital Reports, Oct., 1837, Dr. Addison cites the case of a girl of sixteen, who, in consequence of suppression of catamenia, was seized with hysterical paroxysms, terminating in paralysis of the left side, with coldness, and amaurosis of the left eye. Sparks drawn from the spinal column enabled her to bend the fingers of the palsied arm, after the first operation. In ten days she could walk without difficulty. Shocks were then passed through the pelvis, and in seven weeks the catamenia reappeared, and her general health was restored. The eye, however, remained amaurotic.

M. Marianini reports several cases in which he has been successful with the battery, by placing the negative conducting wire on the instep, and by carrying the positive around the paralyzed limb, and at times touching the skin, at points, occasioning a prickling sensation. By gently increasing the battery currents, the cure was effected with some twenty operations.

Different methods of employing electricity in this disease, therefore, prove, in different cases, successful. Shocks, sparks, battery and electro-magnetic currents, have all been found of service; though, where they have been properly tested, it is believed the latter have proved the most efficient. There is no objection, however, to either of the modes of operating, and perhaps it might be well to combine them in the treatment of obstinate cases.

Local Paralysis. A young man, aged about sixteen, was placed under my treatment in January, 1846, who, from rheu-

matic fever, had experienced a paralysis of the left sterno-mastoid muscle. His head was drawn down upon his shoulder, and, from the contraction, great pain was experienced in the anterior portion of the head. Interrupted currents from the vibrating electro-magnetic machine were passed through the cerebellum, and from the head through the neck and shoulder, for fifteen minutes, when the pain ceased, and the contraction was found to be much less. The operation, repeated on seven successive days, completely restored the patient. Several similar cases have come under the observation of the writer, and have been treated with success.

Dr. Neligan has had experience in the use of electricity in cases of palsy, and among other cases in which he has found it effectual, he cites the following: A girl, aged nine years, experienced paralysis of the right sterno-mastoid muscle, from inflammation of the cervical fascia, in Nov., 1843, which resulted in wry-neck. The treatment was commenced with small doses of saccharated carbonate of iron, with the view of improving the general health of the child, and this was followed with electricity. Of its use and success, he says: "I commenced the use of the magneto-electric machine with the child, by applying the conductors of the instrument, in which, pieces of sponge, moistened with salt and water, were fastened, one to the origin, and the other to the insertion of the right sterno-mastoid muscle. The application was at first for only a quarter of an hour, but was gradually prolonged until she could bear it for half an hour at a time, which period I never exceeded. The weakest power of the instrument was used, and it was applied only twice a week. After the third or fourth application, a decided amendment was visible; the sternal end of the muscle being the first to regain its power, as was evident from its becoming fuller, and contracting more strongly under the shocks. The head gradually assumed its natural position, and was perfectly straight on the 20th of May, at which time, also, not the least difference in the development of the muscle of either side could be perceived.

"In this case, the result of subsequent experience," he adds, "leads me to believe that the cure would have been much accelerated had the electrical shocks been more frequently applied;

but as it was the first case in which I employed the electro-magnetic machine, I was cautious in its application."

Another case in which Dr. Neligan succeeded with this agent was one of almost complete palsy of the forearm, succeeding painter's colic. When the colic pains were removed and the bowels opened, magneto-electricity was applied. Though previously he could not stir his hands, they immediately closed upon the conductor. The applications, being repeated for half an hour at a time, quite restored him in four weeks. A sailor, also under his treatment, had experienced a paralysis of the shoulder, by sleeping for nights together in wet clothes on deck. His right arm first began to feel heavy and numb; it pained him to stir it, and he gradually lost all power over it. Blisters and moxas proved of no advantage. Electro-magnetism was resorted to on the 20th of December, and by the 30th he could use his arm nearly as well as ever. (See Monthly Journal of Med. Science, April, 1846, p. 225.)

Paralysis of the Bladder—Incontinence of Urine, etc. Numerous cases of this kind have come under our personal observation. Our treatment has usually been to pass currents of electricity through the pelvis, from the electro-magnetic machine, in different directions, as we have had reason to believe that other parts were affected as well as the bladder; and external applications, thus made, stimulating every part, have seldom failed to effect the desired relief. Others have adopted other modes for operating, whether with or without the more simple method suggested they do not inform us, and have been successful.

A case is cited in the *Nouv. Encyclo. des Sc. Med.*, Aug., 1846, by M. Heller of Stuttgard. The subject was a carpenter, who fell from the roof of a cottage in the autumn of 1845, affecting principally the cervical vertebræ. No external injury appeared, but paralysis and tumefaction of the right leg, paralysis of the bladder, partial paralysis of the rectum, contraction of the fingers of both hands, and inability to change position. Notwithstanding the free use of calomel, amica, and nitre, this remained for fifteen days, when M. Heller resorted to the use of electro-magnetism. It was applied to the hands,

neck, bladder, sacral region, and right foot. The applications made to the bladder, were by means of passing an insulated catheter, with a metallic stilette, into the organ per urethra, upon which gentle currents were passed from the electro-magnetic machine for from three to six minutes. This completely restored the palsied organ, with seven operations. With seventeen operations, the patient was fully restored, and resumed labor.

M. Hoering relates a case in the same Journal, June, 1847, of a woman, aged sixty, who, while suffering from prolapsus uteri, was attacked with paralysis of the bladder. Eight applications, with one of the conductors introduced into the bladder, as in the above case, resulted in a perfect cure.

In a lecture delivered in 1844, (See Prov. Med. Jour., Dec., 1844,) Dr. Radford reports a case, treated by himself in connection with Dr. Goodwin, of a woman, who recovered after protracted labor, but was unable to pass her urine. Galvanism once applied to the bladder gave permanent relief. A lady in Maine, under the writer's treatment, was as mysteriously relieved by a single operation, who had been troubled with the same difficulty for years, and from the same cause.

Miss S. V. D——, a lady aged nineteen, was placed under treatment Dec. 26th, 1847, who, from the most immoderate leucorrhœa, was reduced in bodily health;—catamenia suspended, limbs paralyzed, and urine retained, and for several weeks had suffered the most intense pain in voiding the least, which was represented as "black and fœtid." Electro-magnetic currents passed through the pelvis, from different points on the pubis to the lumbar vertebræ, gave immediate relief, and for the first time for weeks, the patient voided urine with ease, and obtained rest. With eight repetitions of the operation she was restored to her usual health and regular habits. In incontinence of urine, the same treatment often proves effectual. Enuresis of children, resulting from weakness, may be cured by the same method.

Paralysis of the bowels. It is stated in the *Revue Med.*, July, 1826, in a report by M. M. Emery, Cloquet, and Dubois, that a battery current of considerable intensity, passed from the mouth to the anus, produces a sensation of heat at both ex-

tremities, with flashing before the eyes, and an action throughout the whole intestinal canal, which is felt after the current is suspended, and which usually terminates with evacuation. In one instance this took place after only momentary contact. M. Magendie had also made similar experiments. Dr. Bird says that Aldini, by placing a single zinc and silver plate, connected by a wire, respectively in the mouth and anus of an ox recently killed, produced convulsions of the abdominal muscles and a discharge of fæces. Ackard, of Berlin, produced a similar result upon himself by repeating the experiment.

This peristalic action of the bowels may be produced by either the electro-magnetic shocks, or by battery currents. In constipation, I have found great advantage from both, as used in connection with medicines. In those cases where purgatives are inefficient, by applying gentle currents from the nape of the neck, instead of the mouth, to the anus, they are found to take immediate effect. This is also true in respect to the operation of different medicines. Place the negative pole in connection with a moistened sponge, under the coccyx, and apply the positive at the back of the neck, and the effect will be much the same, whether passed from the battery or electro-magnetic instrument.

Colica Pictonum, which seems to be but a painful paralysis of the bowels, may be equally as well treated by these operations. To relieve the spasms consequent to the disease, and the pains which extend through the hips and down the limbs, the currents may be passed through the abdomen and down the limbs, from the lumbar vertebræ.

Anæsthesia. J. C. Christopher, Esq., of London, describes a case of anæsthesia, or loss of the sense of touch, which came under his observation. The patient had been instructed to make use of a cold hip bath every morning, for a slight leucorrhœal discharge, with which she had been afflicted. On leaving the bath she observed a loss of feeling in the skin, which generally subsided in about half an hour, but which after the twelfth bath became permanent. When Mr. Christopher was called to her, she had no feeling from her toes up as high as the water came when in the bath; she could not fully evacuate the

rectum, and complained of the urine slowly dribbling away. The temperature of the parts was below that of the rest of the system, otherwise she was in good health. Numerous remedies had been tried without success, when electro-galvanism was resorted to.

"An improvement was observed," says Mr. Christopher, "after the second application. The rectum and bladder were the first to regain their normal condition, the thighs and legs next, and the feet and abdomen last. It was interesting to note, during the progress of the cure, that on those days when the *wind was in the east*, and the atmosphere cold, the legs and feet were always worse if the patient left her warm drawing-room and went abroad—a circumstance pointing to the cause of the malady. Electro-magnetism was used on twenty-two occasions, from an hour and a half to two hours at each sitting. It was most interesting to watch the gradual return of sensation under its influence. The method I adopted was, first, to pass a current down the whole spine, for half an hour; then from each side of the sacrum to each foot, for half an hour; then from the spine to the abdomen, for the same period. At the end of twenty-two days the patient was quite restored; no trace of the malady remained." (see Lancet. Aug. 8, 1846, p. 144.)

In several cases of the loss of feeling in the fingers, feet, cheeks, and other local affections of this class, it has been my custom, to pass currents of electricity through the part affected either from my hand or a moistened sponge, and in numerous cases this has proved effectual.

Mrs. L., wife of Dea. L., of Boston, was placed under my treatment in July, 1847, for paralysis of the right side. The limb pained her on the least attempt to use it; a general numbness through the side, from the head to the foot: perspiration entirely obstructed upon just one half the body. From the first operation with the electro-magnetic machine, relief was felt in walking; after the third, perspiration and sensation were improved; and after the tenth, she ceased to call, feeling, as she said, that she was well. Application, general upon the side affected.

Diseases of the eye. Different diseases of this delicate organ are most effectually treated by electricity, to which we shall here briefly refer.

1. *Amaurosis.* This disease is a paralytic affection of the retina and optic nerve, followed by either a total or partial loss of vision. It arises from injuries done the head, compression of the optic nerves, debility, spasms, and from poisons. Its symptoms are very irregular, from which fact amaurosis is confounded with other diseases of the eye. Loss of sight from this disease is usually preceded by the appearance of numerous insects, or substances like cobwebs, interposing themselves between the objects and the eye. The pupil usually retains its natural color, but is sometimes much dilated, at other times contracted, and sometimes it retains its natural size, but in all cases is firmly set, and of a glassy appearance. Of all the remedies yet discovered, electricity is certainly more successful in this disease, than any other. It is variously employed, and with advantage, as will appear from the following cases :

Mrs. B. presented herself for examination in July, 1848; had been afflicted with headache and general debility for years; pupil of the eyes firmly contracted for six months, with ability only to discover larger and moving objects. Electro-magnetism applied, by the positive pole being connected with a moistened sponge, and held upon the back of the neck, while, with the negative in one hand, the operator employed the other in manipulating over the temporal and frontal regions of the head, occasionally touching the orbits of the eyes, the hair and surface being previously saturated. With three operations, perceptible relief; with seven, headache cured, and eyes so much relieved as to be able to return to her residence, her friends continuing the treatment with success.

A large number of cases from different authors might be quoted, in some of which they have met with success, and in others with none, but space will not permit, nor is it necessary. In most cases it is admitted that the failures were to be attributed to an unwillingness to continue the treatment.

At the sitting of the French Academy, in June, 1826, M. Magendie reported several cases, cured by electro-puncture.

His attacks were upon branches of the fifth pair of nerves, instead of the optic, the ophthalmic, the frontal and suborbital, each being punctured in different cases, and feeble currents from the battery employed. In one case he even punctured the frontal nerve, within its orbit, and the lachrymal nerve, and with success. (See Revue Med., July, 1826.)

He again recommends this treatment in his lectures before the College of France, (See Lancet, May, 1837,) in which he declares the treatment to be entirely safe. In the incipient stages, and even where any perception of light remains, he finds the treatment successful. In complete amaurosis, up to that period he had never effected a cure.

Becquerel related a case to the French Academy, in Dec., 1837, published in the *Revue Med.* in January following, in which a man with almost complete amaurosis, was treated by electro-puncture. The frontal and suborbital branches were the immediate seat of the operation. After three months, a decided improvement in the sensibility of the eyes had taken place, and the treatment was committed to the patient's wife, who continued it with success.

The Gazette Medicale de Paris furnishes the particulars of twelve cases of this disease, treated by electro-puncture. In different cases the needle was inserted into the orbit of the eye, affecting the vitreous humor, by which process light is immediately restored, and continued while the current passes, but no longer. In several cases this operation was repeated many times before relief was obtained, and often for months, before the cure became permanent.

Dr. Grapengiesser's mode of operating for amaurosis differs from Dr. Person's just described. He excites the paralytic optic nerve, by irritating, with galvanism, the branches of the fifth pair. To accomplish this, a silver probe, in connection with one pole of the battery, "is introduced into the nose by the patient himself, while the operator touches the region of the frontal nerve, previously well moistened, either without interruption or at momentary intervals." In cases where a stronger irritation is intended, a small blister is previously applied. But it is questionable whether any of these methods,

certainly attended with much pain and inconvenience, are to be preferred to the milder mode of exciting the nerves, by currents passed from the hand of the operator. They are referred to merely to show what has been accomplished by various methods of operating, and that the agent is approved by high authority.

2. *Weak Eyes.* Under this term, it is our object to include impaired vision, from various causes, the more common of which is, perhaps, the exhaustion of the optic nerve. Nothing is more common than for those who are weak from disease, or otherwise, to engage in reading, or fine work, exerting their eyes to the utmost of their strength, until at last, the vision becomes feeble, and the least effort of the eye gives pain. To protect the eye, the lid closes over it, until it becomes exhausted, and finally inflamed; and, perhaps, films upon the orbit, or tubercles upon the lid, are finally formed. Cases of this kind are under our daily observation. Their treatment is simple, and their recovery immediate. As illustrations, a few cases may be cited.

Mrs. D———, with weak eyes of some three years' standing, called on me in October, 1848; was unable to bear the light of the lamp, or to read by that of the sun; unable to sit up for days in succession with pain in the head. Treated by currents from the electro-magnetic machine. Negative handle held by the patient, the positive by the operator, in one hand, while the other was employed in manipulations over the frontal and temporal regions, and occasionally through the eye. The hair previously saturated to render the communication more direct. From the first operation, the eyes were strengthened, and from the eighth, she ceased to call, feeling, as she said, that she needed no more treatment.

A little girl, aged ten, in 1847, was operated upon in the same manner, for twelve successive days, and cured of a weak eye she had not been able to open in a lighted room for three month Cure permanent, one year afterwards.

Mr. T———, engraver, from close application was subject to weakness of the right eye, and fro effort to use it, suffered violent pain. Had tried variou without success. When examined, the eye was highly with tubercles upon the lid, etc. First operation as abov relief, and from the eleventh the cure became complete.

3. *Shortness of vision*, when from disease, and not from malformation, is soon relieved by electricity. Currents to be passed through the eye, from the finger of the operator, with slight currents from the hand, as it is passed over the frontal and temporal regions. Several cases, with deafness, have been entirely cured by a few operations. Mr. M——— was unable to see but a few inches from his face with sufficient distinctness to read; was cured by a few operations, while being treated for other diseases. Miss L——— also cured by a few operations, while being attended for deafness. Electricity is peculiarly adapted to such diseases of the eyes, and when properly employed, is neither unpleasant nor unsafe.

Auditory Paralysis, Deafness. A large number of cases may be cited, of cures of paralysis of the auditory nerves, and deafness from other causes, but enough to give the results of different experiments will here only be given.

Dr. Finella has reported to the Scientific Congress of Genoa several cases of deafness cured by him with electricity. One was of a sexagenarian, who in his youth suffered from atorrhœa, afterwards night-blindness, and finally deafness. The positive conductor was applied to the tympanum, and the negative to the tongue. From the first operation, a slight discharge at the ear took place. The same effect followed the second operation, with a slight improvement in hearing. On the third, both hearing and sight were improved. With twelve operations, the cure became permanent.

Another had become deaf from inflammation of the ear, following rheumatism, and was restored by eleven operations, as in the first case. Other similar cases were treated in the same manner and with similar results. (See Annali Universi di Medicina, Dec., 1846.)

Several cases are reported in the *Bulletin general de Therapeutique*, in which M. Johert de Lamballe effected cures by the following process: A needle was passed into the Eustachian tube, through a sheath, and made to transfix the walls. Another was introduced into the external ear, and made to transfix the tympanum. Galvanic currents were then passed, for a moment through these, and the operation repeated once in eight days.

M. Hoering reports a case, in the *Encyclop. des Sc. Med.*, June, 1847, in which a man, sixty years old, was cured of deafness of a year's standing, by means of an insulated conductor passed into the external ear. The operation was repeated eighteen times.

In the summer of 1847, C. M., a German laborer, was presented for treatment. Six years previous he had met with a fall, striking upon the occipital part of the head. Profuse hemorrhage from the ears and mouth followed, which was arrested with difficulty. Severe headache had since attended him, and from the moment of the fall he had not heard a sound! Operations with the electro-magnetic current were first made upon his head generally, the hair first being thoroughly saturated, and the positive handle held in the hand of the operator, while the negative rested upon a moistened sponge, placed upon the cervical vertebræ, and the communication being made to the head through the hand. From the first, the headache became less violent. After the tenth operation, sounds were heard indistinctly, which were represented as "singing in the ears." With twenty, he was able to hear his own voice. These operations were continued, with currents passed through the ears by means of a fine sponge placed upon the tympanum, to which the current was communicated by an insulated director, until he could hear so as to converse quite well by the aid of a hearing trumpet, when he fell and broke his leg, and ceased to attend. In all some thirty-five operations were made.

E. W., mariner, came into my office January 15th, 1849, being quite unable to hear the loudest tone of the voice when placed near his ear, the result of a cold which had afflicted him a month or six weeks before. An operation was made by placing a fine sponge in one ear, and a larger one upon the external ear opposite, and gentle currents were passed through for five minutes, and then reversed for five minutes. After twenty minutes he heard nearly as well as ever! A second operation on the following day effected an entire cure.

Mrs. S. H. S—— had been gradually losing her hearing for several years, and for the past year more rapidly than before. When first presented, could hear a common English watch,

about three inches from the ear, on each side. With the hand as the conductor, the temporal region and external surface around the ear were gently operated upon, and then currents passed upon the inner ear, as in the above case, for three minutes. After the first operation, the ticking of the watch was heard distinctly, one foot from the ear, the relief being permanent. Seven operations already made, up to the time of writing, have given additional relief, her hearing being now quite restored.

Deafness, from various causes, has been cured by Dr. W. Wright, of London, by the use of battery currents, among which he names the secretion of wax, abuses of mercury, etc.

Tinnitus Aniam, or ringing in the ears, which is often the precursor of deafness, is also speedily cured by electricity. Dr. Hoering cured a patient thus afflicted after recovering from typhus fever, who had been under other treatment for three months, without relief, the first operation giving relief, and twenty-two only being required for a complete cure. The conductor, in this disease, may be passed into the ear, as in deafness; passes with the hand also being made over the surface producing external excitability.

St. Vitus' Dance. (*Chorea Sancti Viti*) By some physicians this peculiar disease has been attributed to weakness, or relaxation of the muscles; it may also arise from extreme excitability of the nervous system, from violent affections of the mind, as anger, fear; or, it may be symptomatic of other diseases, in which case they are to be removed before it can be cured. From whatever cause it may arise, electricity, in certain forms, has proved highly useful in its treatment.

Guy's Hospital Reports, of different dates, contain the most flattering recommendations of its use, as there employed by Dr. Bird, and his colleague, Dr. Addison.

The following cases, quoted in the *Medical Gazette*, June 18, 1847, p. 1,065, will give an idea of the high reputation the practice has already attained in that popular institution.

1. A little girl, aged eight, was admitted November 2d, with chorea, which had supervened upon rheumatism, and with which she had been afflicted for two weeks. "Her existing symptoms,"

as described by Dr. Bird, "were continual involuntary jactitation of the legs and arms, with continual contractions of the muscles of the face. She complained of stiffness in the neck, and spoke with extreme difficulty. She took vinum perri and sulphate of zinc, for some time; but getting no better, electricity was ordered on December 2d.

Dec. 8th. The sparks had been taken daily from the spine. She now speaks and swallows without the slightest difficulty; the involuntary movements are much diminished.

Dec. 18th. She left the hospital quite free from all trace of chorea. She remained well until June 20th, 1838, when she was brought to the hospital, affected with chorea, confined now to the upper extremities. The electricity was again ordered, and she rapidly got well. That chorea is often excited by intestinal irritation is well known, and the possibility of curing such a disease with purgatives is notorious. It will, however, sometimes happen, that, although the exciting irritant is removed, the effects on the nervous system remain, and chorea persists. In such cases electricity soon effects a cure.

2. The next case is that of a boy twelve years old, with chorea of ten months' standing, which appeared to have arisen from the irritation of a tape-worm. Purgatives and the sulphate of zinc were employed for two months without benefit. January 6th, Dr. Bird notes his symptoms as follows:—"Involuntary movement of almost every muscle, so that he had considerable difficulty in walking, and was quite unable to support himself on one leg; his arms were in constant motion, and he had so little control over his fingers that he could not retain anything in his grasp, even for an instant; the muscles of his throat were also in a state of constant involuntary motion, so that his articulation was imperfect, and his words frequently unintelligible; his head was constantly moving, being, with his neck, alternately thrust forward and retracted in a jerking manner. Sparks were ordered to be taken from the spine on alternate days."

January 9th, much improved. Involuntary movement of the legs and arms much less. 13th, rapidly convalescing. Feb. 9th, presented well.

Where chorea exists in girls as a result of the disturbance of

enervation from amenorrhœa, anæmia either not existing, or cured by iron, it is a good practice to transmit a few shocks through the uterus, in addition to the sparks from the spine. In this way the catamenia will be generally excited, and the rapidity of the cure be increased.

3. E. R., aged sixteen, of previous good general health, menstruated for the first time three months ago. After the disappearance of the discharge, she became the subject of involuntary motions of the right arm and hand; these have increased in intensity up to the present time. She appeared at the electrical room in July, 1838; sparks were taken from the spine, and a few shocks passed through the pelvis. After the electricity had been applied five times, the catamenia occurred and the chorea vanished. She continued well until September 19th, when, as the discharge had not appeared at its proper time, she again applied at the hospital. A few shocks through the pelvis excited the deficient function, and she left quite well. I have never seen any good effects to result in cases of chorea from the transmission of electric shocks along the affected limbs; on the contrary, in every instance the involuntary movements have been increased, often to an alarming extent; and, if employed when the patient was convalescent, it has invariably aggravated every symptom, and often rendered the patient as bad as when first admitted under treatment.

4. Other cases are related of partial convulsive movements, affecting different muscles, as the result of fear, in all of which electricity affected the cure, after other remedies had failed. Thirty-six cases are described in one report of this disease, from various causes, of which twenty-nine were cured by electricity when other treatment had failed, five were relieved, one left from alarm, and one found no relief at all. Dr. Bird concludes by saying—

The results of my trials of electricity in chorea may thus be deemed very satisfactory. I am quite aware others have not met with the same success, and this is easily accounted for, in their merely seeking the aid of the remedy in cases which obstinately resisted all other means, instead of using it as a primary remedy. Of all the remedies I have hitherto used, except perhaps

the sulphate of zinc, electricity seems most successful in chorea, and I have invariably employed it wherever I possibly could, since I first saw it employed by my friend and colleague, Dr. Addison, who, I believe, first suggested its use in this disease.

It might now be inquired, In what manner does electricity cure chorea? Having reflected much on this subject, I have adopted the conclusion that, as a counter irritant over the spine, it is of more value than other remedies of this class, from its ready application, and the intensity of its action, and the capability of renewing it daily. It exerts a very important influence over the spinal nerves, and thus aids in submitting them to the dominion of the will. In addition to this, I believe the remedy acts by exciting powerful contraction of the muscles, and thus aids in overpowering their irritability. Indeed, in this way, even independently of all countervention, I have more than once seen electricity cure chorea. A remarkable instance of this is at this moment in Guy's. A girl, aged fourteen, was admitted under my care, in Miriam ward, with obstinate universal chorea. I never met with a case in which there was more reason to suspect organic mischief, and which so completely resisted all remedies, the chorea movements continuing long after the restoration of her general health. I therefore left all treatment, and requested my clinical clerk to pass a series of electro-magnetic shocks through the arms. In a few days the movements lessened, and in a few weeks quite ceased.

To this might be appended several cases which have come under the observation of the writer. At present, however, a single case will be given.

W. T——, a shoemaker, was presented for treatment in June, 1846. From childhood he had been subject to slight attacks of chorea, up to the present time. Age twenty, general health good, system stout and muscular. Chorea general, feet and hands in constant involuntary motion; cannot sit in a chair, so general is his movement; head thrown forward and back by constant jerking; the wildest gestures and grimaces of the face imaginable. Has been in this state constantly for six weeks. Currents from the magneto-electric machine passed first through the spine, a wet sponge being attached to the conducting wire

from the negative pole, and placed under the coccyx, with the positive applied to the occipital part of the head and back of the neck. In five minutes the jerking of the head became less. Currents were then passed through each limb, from the lumbar region, to the feet, and from the cervical, to the hands. These, with the currents through the spine, were continued for half an hour. Involuntary motion quite ceased, and the patient conversed with ease. On each successive day, these operations were repeated for the same length of time. No return of chorea, and the patient discharged cured.

As chorea arises from a variety of causes, different applications of electricity will be found necessary in its cure. The direct relief, experienced in some cases by one operation, while, perhaps, another is not relieved at all, but is speedily cured by some other mode of operating, accounts for the success of some, and want of success by others. In this, as in other diseases, it is not enough to *try* electricity; it must be *tried* in a manner adapted to the nature of the disease, and to the condition of the patient. In many cases, the treatment is to be followed for days, perhaps weeks or months, and varied, as other treatment is varied, by its effects and the changes through which it is perhaps necessary for the patient to be carried before a cure can be expected. Such allowances are made for other systems of practice, often extending to years, and yet the patient and practitioner persevere; with this system, why should we not be willing to persevere, if necessary, for months?

Neuralgia. (*Tic Douloureux.*) This disease is defined "a pain in the nerve," and some have given to it, when in the facial nerves, the name tic douloureux; and when in the sciatic, the name sciatica. Others have represented the condition of pain or uneasiness as allied to neuralgia, in whatever part. The various causes, nature, and treatment of this disease, will best appear by reference to different cases, in which electricity has been employed. As will be seen, the disease is sometimes primary in different nerves, and sometimes symptomatic, or connected with other diseases, requiring quite different treatment. I have known it to attack the nerves that have their origin in the cervical portion of the spinal cord, and which distribute

themselves through the neck and back of the head, with such violence, as to drive the sufferer to the most desperate acts. Indeed, in its attacks upon any nerve, in its most violent form, it is quite insufferable.

1. L. H., sea captain, aged forty-five, of stout muscular form, and general health excellent, was seized with this disease, in June, 1846, in the left occipital part of the head. The pain was most intolerable, affecting the mind, and driving the patient almost to madness. Different remedies were employed, but without the least relief. For two weeks the patient obtained no rest, but spent each night in the greatest agony. First saw him at 10 o'clock in the evening, tossing from side to side upon his bed, and groaning most mournfully. Electricity was at once applied. The hair was saturated, the foot placed in the metallic shoe, to which the negative pole of the electro-magnetic machine was attached, and currents passed from the hand through the operator, from the positive, through the head to the feet, for half an hour. The patient seemed quite easy, and for the first time conversed freely for twenty minutes, when he was left in charge of his attendants, who reported that soon after he fell asleep, and rested quietly for an hour; that they then also fell asleep, and that all slept undisturbed until 7 o'clock the next morning. The patient then felt no return of this distressing disease, but on the second day following, called, with an unpleasant sensation in his ear, which was at once relieved by electricity, after which not the least trace of the disease remained.

In more than three hundred cases of neuralgia, I have witnessed the benefit of this agent, and in no case, when properly employed, have I known it to fail of imparting relief. It has been differently applied by different practitioners, and with success, to some of whom we take the liberty to refer.

M. Magendie recommends its use in neuralgia, by electro-puncture, the magneto-electric machine being employed. From the *Medical Gazette*, the *Medica-Chirurg. Review*, July, 1841, quotes the following:—

M. Thelin had been subject to frequent attacks of most severe neuralgia, affecting the superior maxillary nerve of the left side, when he first consulted M. Magendie. The pain in the gums,

lips, cheek, and alamasi, was insupportable. The patient could scarcely utter a word; and as for mastication, it was impossible. All methods of treatment had been tried, and all tried in vain. But with having many of his teeth extracted, and being leeched, and blistered, and physicked for months and months, at a time, his constitution had suffered severely. He consulted M. Magendie on the 5th of March, 1838. At one sitting of a few minutes, the pain was *chassé*. Since that period, whenever the neuralgia returned, he repaired to M. Magendie, and always left him cured of his suffering. It is now several months since he had an attack.

M. James states that the following mode of applying galvanism or electricity to nerves suffering from neuralgic affections, rarely fails of effecting a cure. He is inclined to think the numerous failures which other practitioners have met with in the use of this remedy, are owing to the circumstance, that the electric fluid was never made to pass through the nerve at all, but along the skin merely,—rarely, if ever, being made to penetrate to the affected nerve. A fine needle, about two inches and a half long, made of some metal that is not easily oxidized, platina or gold being the best, and finely polished, is introduced into the seat of the affected nerve. The needle is recommended to be pushed straight down to the affected nerve at once, and not to be turned round, as is often done in introducing needles into rheumatic parts. All needles composed of metals which are oxidizable are condemned as hurtful, both because they give pain from their loss of polish, and from their causing an indelible stain in the spot where they are introduced—a circumstance which is especially to be avoided when operating upon the face or other exposed parts of the body. The neighborhood of important blood-vessels, is, if possible, to be avoided; at least they should not be transfixed. It is not, however, indispensable to pierce the nerve; it is stated that it is sufficient if the needle be in contact with it. Two needles are generally requisite—one at the origin of the affected nerve, the other towards its affected terminating branch. The introduction of the needle rarely gives pain.

The needles being fixed, a current of electric fluid is made to

pass along the nerve, the positive pole being put in communication with the needle fixed in the origin of the nerve, and the negative pole with the needle inserted at the extremity of the branch. The voltaic pile of five or six plates, usually furnishes a sufficiently powerful current for the first sitting. The electro-magnetic apparatus of Mr. Clarke of London, is recommended as that which is both most convenient, and whose intensity can be increased most easily at will. The wires of the electric apparatus are only to be kept in contact with the needles for a few seconds; in some cases, however, a continued current of the electric fluid is made to pass along the nerve. A kind of pricking pain is experienced under the influence of the electricity, most acute at the negative pole.

Several sittings are required before the neuralgic pain leaves the nerve; after it does leave it, however, the application must not be immediately discontinued, as sometimes it returns. It is, therefore, recommended, before withdrawing the needles, to wait for a few minutes, and direct the person to make the motion which usually brought on the pain; if it returns, one or two additional shocks, passed through the nerve, will make it entirely to disappear. No after treatment is necessary; and when properly performed, the punctures give no uneasiness, and require no treatment.

M. James relates a number of instructive cases of neuralgic affections of the nerves, which occurred chiefly in the practice of M. Magendie, who is the great advocate of this mode of treating neuralgia, which were relieved by the use of electricity. (See Edinburg Med. and Surg. Journal July, 1841.)

Doubtless many have failed in their operations to pass the electric fluid upon the nerve at all, as intimated by M. James, but it remains to be proved that electro-puncture is the only, or even the best method, by which such failures are to be obviated. In our own practice, in such cases, we have not failed of success, by making the communication upon the surface, giving proper direction to the current, through the location of the directors through which communication is effected. In this, as in other diseases, there is a guide by which the operation should be controlled. When the current first reaches the diseased part, the

patient will complain of a pain, much the same as that produced by the disease, a sensation which will usually lead him to exclaim, "that is the place," "there it is," etc. The direction of the current may be varied until such effects are produced; and when you have succeeded in thus affecting the diseased nerve, it is better not to pass the current constantly, but to employ one of the directors in gentle manipulations. At every hour in the day, I am employed in making operations by this method, with the most favorable results. The inconvenience of electro-puncture is avoided, and in no case does the operation give more pain than that experienced from the disease alone.

Sciatica. This form of neuralgia, so difficult to treat with the usual remedies, yields at once to the use of electricity. Numerous cases are on record, in which electro-puncture has proved successful, it being the first resort by some, when electricity is indicated, while from observation in a large number of cases, we have found the method above described equally as effectual. Channing, in his notes, just published, cites several cases, treated by Dr. E. Hermel, published in the *Annales Medico Psychologiques*, March, 1844, and noticed in the *Lond. and Edin. Month, Jour. of Med. Sc.*, June, 1844, which we take the liberty to copy.

"I. A man, in the Hotel Dieu, aged 44, afflicted with traumatic neuralgia of the sacro-lumbar and lesser sciatic nerves, of five months' duration. Vapor baths had been very useful. Subsequently, moxas had been employed without benefit. The needle, connected with the positive pole of a battery of twenty pairs, was inserted into the sacro-lumbar region, and the negative needle, a little below the external malleolus. The applications, which were of ten minutes, excited copious perspiration in the limb, which could immediately afterwards be bent with less pain. After the fourth or fifth application, the pain did not return, but electro-puncture was still repeated on the three subsequent days.

"II. A man in the Hotel Dieu, aged 26, with neuralgia of the right peroneal nerve, of fifteen days' duration, accompanied with convulsive movements. Exacerbations at night. The first application removed the night pains, and lessened the movements. After the third, the punctures became pain-

ful, and a suppurating pustule appeared later, which was speedily healed. No further application was made, and he left the hospital cured. There was no perspiration of the limb in this case.

"III. A man with sciatica, of four months' standing, was the subject of a single application. It is referred to as having produced a copious sweat.

"IV. A woman at the Hotel Dieu, aged 70, laboring under sciatica, of a very aggravated character, of six months' standing. One application caused copious sweating, and effected a cure.

"V. A harness-maker, aged 33, at the Hotel Dieu, with neuralgia of the lumbar plexus, of a month's standing. It had been relieved by leeching and cupping, but had returned. One needle was inserted in the right lumbar region, the other just within the anterior superior spine of the ileum. Twenty pairs of plates were used for twelve minutes, which gave relief. Some slight shooting pains remaining, the application was repeated, three days later, with thirty pairs of plates. From this time he remained well, and was dismissed eight days after.

"VI. A butcher's boy, at the Hotel Dieu, with double sciatica and paralysis, of five weeks' standing. The first application brought the pain to an end, and was followed by involuntary discharge of urine during the night. Several applications were made afterwards, and in thirteen days he was cured, and in twenty-one days dismissed.

"VII. A laborer, aged 45, in the Hotel Dieu, with double sciatica and partial paralysis, of a month's standing. He complained of almost total want of sleep. After the first application of electro-puncture, a copious sweat occurred in both limbs, with immediate relief to the pain, and increased power of motion. He also slept well. On the next day, it was repeated with equal advantage, Application was suspended for sixteen days, the vapor bath being substituted. He was then able to walk with only a stick; but, on account of a four hours return of pain in the right thigh, electro-puncture was used for the third time, with the effect of permanent relief, until his dismissal, nine days later, a slight numbness only remaining.

"VIII. A man aged 27, with severe sciatica, of fifteen days' standing, following meningitis. Electro-puncture, beef tea, and an anodyne were prescribed. The first application was with difficulty borne for four minutes. The next day, the patient better, and electro-puncture applied for ten minutes. The pain ceased, but he was still unable to stand. The next day, electro-puncture for the third time. He stood and walked. Two days later he was dismissed, cured."

Again, cases are noted by the same author, of cures by M. M. Bally and Meyraux, as published in the *Revue Med.*, Oct., 1825, which we also copy.

"I. A man, aged 63 years, in the Hospital de la Pitie, in 1825, having femoral neuralgia of eight years' standing, was subjected to electro-puncture. One needle was inserted in the lumbar region, the other in the middle of the inner part of the thigh. The patient's constitution was irritable, and strong contractions were produced by a current from four to six pairs. After the second application, the intervals of paroxysm became longer, and the paroxysms themselves shorter. After five applications, he was completely cured.

"II. A man, aged 26 years, with sciatica, which had prevented an upright position for six months, and on which the usual treatment, including simple acu-puncture, had been exhausted, was subjected by the same physicians to electro-puncture. In ten applications, the cure was complete.

"III. A man entered the Hospital de la Pitie with femoral and perineo-tibial neuralgia. The paroxysms and spasms were very frequent and severe. One needle was inserted above the great trochanter, the other in the ham. The first application occasioned relief, and a cure followed the eighth.

"IV. A man, aged 34, with neuralgia in the inferior and inner part of the foot, of a very severe and paroxysmal character. Cured by eight applications."

Numerous authors might be cited in proof of the utility of electricity in sciatica, but space will not here permit. Nor is it necessary. The question is no longer, "Is it useful?" but, how may it be *best* employed? As we have stated, our own experience has taught us that currents properly passed from the electro-magnetic machine, without electro-puncture, are sufficient. Others may prefer different methods.

Dr. Merchant, of Hemsworth, relates his own case, (See Lancet, July, 1827,) in which the cure was effected by drawing out sparks from the diseased part, while insulated. The pain extended from the sacrum to the hip, and long resisted the usual treatment of blisters, leeches, and opium, when Dr. Merchant resorted to electricity. Night and morning, for fifteen minutes, the affected part was subjected to electrical treatment, and materially improved in one week, and entirely cured in

three. In the Reports of Guy's Hospital, this mode of operating in sciatica, is highly recommended, and for simplicity, at least, is to be preferred to electro-puncture.

Neuralgia of the Tongue. A lady afflicted with this disease, in connection with dyspepsia, has lately been under treatment. For several years, she has been subject to violent pains through the thorax, affecting the tongue to such a degree as to render articulation quite impossible. At times the pain extended from the tongue, through the glands to the ears, rendering it difficult to turn the head, or to swallow .The various remedies of one of the most skilful practitioners had been tested without success, when, as the last resort, she was presented for electropathic treatment. Electrical currents were passed from the electro-magnetic machine, first through the thorax, in reversed order, then through the glands, with passes of the hand, when charged, over the surface of the face and neck, for twenty minutes. Relief was experienced at the first operation; with fifteen, the patient was quite free from pain; dyspepsia improved, and general health better; in six weeks, with gentle purgatives and tonics, the patient was restored. In other cases, two or three operations have been sufficient to remove the disease, and but few are required, except in chronic forms of the disease.

M. Magendie has cured diseases of this kind by electro-puncture, which seems to be with him the principal mode of operating. Needles were inserted into the affected side of the tongue, and the trunk of the facial nerve where it enters the parotid gland, and, by a current passed for a moment between them, the pain removed immediately to the mental branch of the inferior maxillary nerve. It was then driven into the infra-orbital nerve, and thus pursued, until by a single sitting it was expelled, in one case, and in another, ultimately. (See Med. Chirug. Rev., April, 1846.)

As has been intimated, every nerve in the system is liable to suffer from neuralgic affections. Dr. Hoering reports a case of neuralgia in the bladder, occasioned by cold, and aggravated by the frequent voiding of water. An insulated conductor was passed into the bladder, to which one of the poles of the battery was attached, and the other applied to the epigastrium. Six-teen operations effected the cure. (See Encyclop. des Soc. Med.,

June, 1847.) I have cured the same disease, in different cases, by passing currents through the pelvis, in opposite directions.

Intercostal Neuralgia. From their constant exercise in the expansion and contraction of the chest, the intercostal nerves are specially liable to become diseased. From exhaustion or weakness they often give rise to difficulty in breathing, or the proper expansion of the chest, and from neuralgic pains to suffering the most excruciating. From an extensive observation, I have reason to believe that four-fifths of the pulmonary diseases of the day have their origin in diseases of the intercostals. In many cases of cough and labored respiration, it is truly wonderful to witness the instantaneous relief experienced by operations upon these nerves. In whatever state of disease they are found, electricity may be employed with advantage. For the past three years more than one half the patients under treatment, have been benefitted by operations affecting the intercostal nerves and muscles. Such operations relax the chest when contracted, give freedom to the vital organs, and regulate their functions. Under no circumstances, are they, if properly made, found to be injurious.

Dr. Ranking reports a case of intercostal neuralgia, in which he found, in the use of electro-magnetism, the only curative remedy. The patient was subject to attacks of excruciating pain, referred to each side of the thorax, at the union of the ninth ribs with their cartilages. These attacks were periodic in character, symmetrical in locality, and with the absence of fever. Quinine, iron, colchicum, and arsenic, were each tried in turn, but without success. Ether was inhaled during the paroxysm, but on the return of consciousness, the pain returned. Morphia gave relief, but only temporary.

"Under these circumstances," says Dr. R., "I determined to give little or no medicine, merely bismuth and rhubarb, and to have recourse to electro-magnetism. This agent was perated with every day during twenty minutes, and a few days only had elapsed, when decided benefit was declared. The intervals between the paroxysms were prolonged, and the pain gradually became so tolerable, that the patient was enabled to dispense with his morphine. In the course of a

month it had entirely left him, and to this time (nearly eight months,) he has not had the slightest return.

The instrument employed, was that recommended by Dr. Golden Bird, (the common electro-magnetic machine). The currents were passed through the arms first, for the space of twenty minutes, the patient holding the conductor in each hand. It was subsequently made to traverse the intercostal nerves, by placing one conductor over the spine, and the other alternately over the painful spots. The tension was preserved as high as it could be borne. (See Prov. Med. and Surg. Jour., April 19, 1848, p. 206.)

DISEASES OF THE CHEST.

In this class of diseases, a careful discrimination should be made between those affecting the chest only, and those extending to the various internal organs—in other words, between those of the chest, and those of its contents. From many causes, the chest is especially liable to attacks from disease. To some of these attacks allusion has already been made, but in their treatment it is well to be more definite.

1. *Contraction.* It is surprising to what an extent the variations in size of the chest may be carried, and how many causes combine to produce such effects. From weakness, and the stooping position which many assume in business and from habit, the chest may be contracted *one-third* in its circumference. The effects of dress in accomplishing the same object, are well understood, with the diseases which follow therefrom. Now, in the treatment of different diseases, this condition of the chest should be observed. A wise dispensation has made this part of the system the deposit of the most delicate organs —vital jewels. To preserve their various functions, each requires its proper space and location; and, though no other inconvenience may be experienced at first, by attempts, either voluntary or involuntary, to make it of less than its proper size, than general weakness, a long catalogue of evils will surely follow in their life-destroying train. Nor can these evils be remedied until the first and principal evil be removed.

Electricity, properly employed, in connection with other treatment, is of the greatest value in the expansion of the chest. Its effects are most instantaneous, and in all cases it is safe. The negative communication should be at the nape of the neck, and over the cervical vertebræ, while the positive is at the pit of the stomach, and along the sternum (os pectoris). In different cases, the application should be different, as will appear from the following:

2. *Injuries from Sprains*, etc., often produce pain through the shoulders, and strictures across the chest, causing much difficulty in its proper expansion and contraction. These are readily relieved by passing currents from the electro-magnetic machine through the chest in an opposite direction. Timely attention to such injuries, saves much suffering, and protects against more fatal diseases. I have frequently seen those apparently far gone with consumption, entirely restored by the most gentle operations, in which cases their disease was traced directly to some injury done the chest. A case has been described (page 36,) of a young man given up by his friends and physicians, who was speedily cured. His disease proved to be the result of a fall, where he was required to hang upon his left arm, to prevent falling some fifty feet upon rocks, for some fifteen minutes. Similar cases are often the result of injuries, scarcely perceptible at the time, but which by degrees weaken and reduce the strength of the chest, through which its contents are sooner or later impaired.

3. *Palpitation of the Heart.* When from contraction of the chest, as it often is, palpitation is speedily and permanently cured by those means which give expansion and strength. So, too, when from deficiency of nervous energy. Indeed, from whatever cause, palpitation is successfully treated by electricity. From many important cases, a few may be selected.

Miss C——, of Portland, was presented for examination in Dec., 1845, with palpitation, with which she had been afflicted for several years. From the least effort, the blood apparently forsook the extremities, and rushing to the heart, produced the most violent palpitation, and to ascend one flight of stairs, would so much increase it as often to cause fainting. So

violent was the heart's action, that the whole system was shaken by its pulsation. The sensation of distress and suffocation, seemed quite insufferable. Extremities cold, lips and face purple, etc. Currents from the electro-magnetic machine were first passed through the chest, from hand to hand, then from the back of the neck to each foot, and finally, from the pit of the stomach, and through the region of the heart, to the cervical portion of the spine. Relief from the first operation, and from a week's treatment, quite restored, at which time her friends obtained a machine, and continued to make the applications from time to time, as found necessary.

Mrs. D——, of Charlestown, November, 1848, had been subject to attacks of palpitation for several years, which, for some two months, had been greatly increased; quite unable to exercise, and on falling asleep, suddenly aroused by violent palpitation, accompanied with distress, and a sense of dying. Currents as above described, were passed through the region of the heart, each operation giving relief, and the tenth effecting a permanent cure. When this disease is attended with general debility, as in the first case cited above, the object should be to regulate the circulation through the system generally, which requires a general, as well as local application.

4. Consumption. (*Phthisis.*) So many are the curative remedies, put afloat for this incurable disease, that it is with much hesitation that we are led to suggest the use of electricity at all. And, now, it is in only the incipient stages of the disease that it is to be recommended as a curative agent. When once ulceration has taken place, it is believed that but little hope of recovery can be realized, though some give full assurance, that electricity has effected cures, in such cases. Their mistake is probably to be attributed, not to the fact that people have recovered when supposed to have consumption, but to the error in supposing that in that disease their lungs had ulcerated.

There can be no objection, however, to the passing of gentle currents of electricity for the purpose of alleviating the sufferer's distress. When the respiration is difficult, the extremities cold, and even when the patient becomes delirious,

a judicious application of this vitalizing agent, is found to invigorate the system, temporarily restoring the mental powers to the last, and, comparatively, to give ease in the dying hour.

Previous to ulceration having taken place, much may be anticipated from a judicious treatment upon electrical principles. Dr. Wilson Philip, in his treatise on the vital functions, says, pp. 340–1, 2d Vol.: "In some, laboring under the most chronic forms of phthisis, in whom the symptoms had lasted several years, and habitual asthma had supervened, the relief obtained from galvanism was very great, notwithstanding the admixture of a pus-like substance in what was expectorated." In cases of inflammation, it should be employed as a counter irritant, by exciting action in the extremities and upon the surface. In tuberculation it may also be employed, with some degree of assurance, in promoting absorption; and for increasing vital action, in some cases where the disease is confined to the mucous membrane.

In all cases, the general tone of the system may be improved, as has been intimated, even to the latest moment of life, by its vitalizing power. Its use, however, like every other remedy, is the most salutary, in the first stages of the disease, and even then, when applied through the cavity of the chest, its application should be gentle, and well directed. The greatest advantage of the agent, as it stands connected with consumption, is its use in diagnosis. It does afford a medium through which to determine for a certainty, the absolute condition of the lungs as well as other parts affected in this disease. With this information there is but little difficulty in determining the question of recovery.

5. Bronchitis. (*Laryngitis.*) In the first stages of this disease, too, electricity affords great relief, and, perhaps it may with safety be employed in all cases. Its influence upon the mucous membrane is direct, it gives tone to the organs of secretion, and strengthens the system generally. An extreme case of this disease came under observation some months since. Mr. O——, of this city, aged about forty, had been for eight months, subject to bronchitis in its worst form. The

usual remedies had failed to give the least relief: on the contrary, he had been all the time on the decline. As a last resort he had been advised to seek a more favorable climate, and was about to leave for the Southern States, when a friend suggested electropathic treatment, and he was induced to call on me. System very much emaciated, countenance haggard, pulse almost imperceptible, cough violent, and for hours at a time, almost incessant, larynx and trachea much inflamed and swollen, voice feeble, articulation scarcely audible; from 10 o'clock, until about 3 o'clock, P. M., each day, for the past few weeks, has felt a sense of coldness, or death, so much that the extremities became cold and rigid, "night sweats," etc. Treatment.—First, currents from the electro-magnetic machine passed through the system, from hand to hand, for five minutes, then through the spine for ten minutes, then through the limbs, from the lumbar region to the feet for five minutes, then through the chest, from different points, for ten minutes, and then through the larynx and trachea, for from five to ten minutes. In all these operations, the positive conductor was the hand of the operator, and the current, which was feeble, gently varied to the condition of each part affected. The trachea, larynx, and intercostals, were at first very sensitive to electricity, but from the first became less so. From the first sitting, respiration and expectoration more free. Dr. Paige's cough drops and purgative powders were ordered, in connection with the operations, which were to be repeated each day at 10 o'clock, A. M. After the fourth operation, no return of the cold turns were felt, and but little insensible perspiration; the cough, too, was less, and expectoration free. In three weeks, voice quite restored, pulse distinct and regular, cough but slight, appetite good, extremities of normal temperature, and less emaciated. Operations only on each alternate day; continues to improve, but having made arrangements to go south, and from fear of the changeable climate at home, it was deemed advisable to leave. An instrument was taken, with medicines, and the treatment continued, which, as we learn, has quite restored the patient. Less obstinate cases have yielded

to the use of electricity alone ; in a few days or weeks, the immediate change in the tone and strength of the voice showing, most conclusively, the adaptation of this agent to this fearful disease.

6. *Affections of the Liver*, of different kinds, are effectually treated by the use of the electro-magnetic machine. They may also be detected by its use, to a certainty, in the hands of an experienced practitioner. As moderate currents promote absorption, and increase the vital action in the tissues, its use is important in cases of *enlargement of the liver ;* and as its stimulating power gives tone and energy to the part to which it is applied, it may be employed with great success when the liver is in a *torpid* state. The current should be passed from the hand of the operator, through the liver, and the nerves with which it is connected, from the pit of the stomach and over the liver, to the cervical vertebræ, the intensity being varied to the strength of the patient, or the sensitiveness of the part operated upon. Thus employed, its effects are as immediate, and much more permanent, than that of the cómmon remedy, in such cases, calomel. Dr. Philip says of its use, "I have repeatedly seen the same effect upon the biliary system which arises from calomel ; a copious discharge from the bowels coming on within a few hours after its employment."

7. Asthma. The observations of numerous practitioners, combine in placing electricity among the first and most efficient remedies ever to be employed in this distressing disease. I have seen those who for days and weeks were unable to recline for an hour's rest, from habitual asthma, by a single operation of some thirty minutes, so fully relieved that respiration became easy, and they could sleep with the utmost composure. Often, however, to protect against asthmatic paroxysms, or to effect a permanent cure, the treatment is to be followed for several weeks. Weakness of the chest, affecting the eighth pair of nerves, more especially, seems to be the more direct cause of this disease, and to this part of the system the treatment should be directed. Currents from the electro-magnetic machine should be passed from different

points across the pit of the stomach and around the sides, to the upper cervical vertebræ, varying the time of operation and the intensity of the current to the necessity of the case.

Several cases are referred to by Channing, in his Notes of cures effected by Dr. Wilson Philip, as follows:

"1. A lady, aged 35, for many years subject to habitual asthma;—breathing very much oppressed. The immediate effect of the application was to give greater ease than she had experienced for years. Part of this relief remained permanent, and when galvanized for ten minutes daily, she suffered little dyspnœa. On one occasion, to try the effect of imagination, he deceived the patient by scratching the wire upon the neck, without allowing the passage of the galvanic current. No relief was felt. He then passed it from the neck to the upper part of the chest, when slight relief was obtained. Finally the current was passed to the pit of the stomach, when the usual effect of former applications was experienced.

"II. A young woman, who had been several times galvanized in the usual way, was treated by a current passing down the spine. The breathing was easier, but less so than on former occasions; and after exertion, she was obliged to have recourse to galvanism, as previously administered. This patient remained free from the disease for half a year, when she returned with a slighter attack, which yielded immediately to galvanism, in connection with remedies, which alone had proved inactive.

"III. A blacksmith, aged 50, with severe habitual asthma of seven months' standing. Cough troublesome, with thick, yellowish expectoration. After three applications of galvanism, for about ten minutes each time, he declared himself well, and resumed work. Several weeks later, the disease was renewed by intoxication, and he was again relieved with equal facility. During ten months, several slighter attacks occurred, following exposure, which were immediately relieved in the same manner.

"IV. A gloveress, aged 28, with asthma of four years' standing. The breathing was rendered easy, in a few minutes, by galvanism, and, after the second application, continued so. Three weeks later, she experienced some return of dyspenœa, which was relieved by a blister, which had been previously tried with slight effect. During several months after, she remained well.

"V. A female domestic, aged 30, with asthma of two

months' standing. She was relieved in a few minutes, and, after three applications, remained well for several weeks. Reference is made by Wilson Philip to several other similar cases.

"VI. A laborer, formerly a soldier, aged 68. He was unable to walk, save at a slow pace, and sometimes had been obliged wholly to abandon work. During his most severe attack, he was relieved in a few minutes by galvanism; and after three weeks of daily application of ten minutes each, the relief became permanent. A sense of sinking in the stomach was perceived in this as in the previous case, after the application of electricity (probably from the stimulation of that organ), which was removed by carbonate of iron. After two years, this patient had experienced no return.

"VII. A female domestic, aged 40, with asthma of five years' standing. The first application of galvanism gave great relief; but this proved unequal in subsequent administrations. Her attendance was irregular, and her consumption of malt liquor excessive. Her breathing and digestion were both improved, though the former continued oppressed.

"VIII. A female domestic, aged 24, with asthma of a year's standing. She was quickly relieved by galvanism, but the effect was not permanent. She was cured, subsequently, by an alterative course of medicines—in part, as Wilson Philip suggests, a result of the previous electrical treatment.

"IX. A domestic, aged 29, with severe asthma of a year's standing, and an inflammatory tendency. She was much relieved by a few minutes' application, and her case improved for ten days, when galvanism failed of its effect. The epigastrium was now tender on pressure. This was removed by blood-letting, blistering, and small doses of calomel. Galvanism became then more efficient even than in the commencement, and she finally left, much, though not entirely, relieved.

"X. A woman, who had for many years labored under habitual asthma, was galvanized incautiously with such power as to occasion severe pain, and a refusal to submit herself again to the application. She had obtained, however, immediate relief to her breathing, a part of which remained permanent many months afterwards."

In the *Revue Med.*, Feb., 1824, we also find notices of a paper read by M. Pascalis before the Royal Academy of Medicine, also noticed by Channing.

"I. A woman, aged 32, an enamel worker, had been asthmatic for ten years. Of late, the disease had increased, and

for periods of fifteen or twenty days, there would be a diurnal access of alarming severity. This would be followed by an interval of comparative rest for two or three weeks. The current from a galvanic pile was passed from the back of the neck to the stomach. With the first application, the inspiration, cough, and expectoration, became easier; the rale, previously loud, was hardly to be heard. After eight sittings, in the course of fifteen days, she was presented in the following condition: The specific attacks had ceased. The patient, for the first time, could assume a horizontal position. She could walk without suffocation. A goitre sufficient to embarrass respiration, had diminished, within these few days, an inch and a half in circumference. The patient was able to laugh, without distress, from which she had been long prevented. As a last effect, the application had determined frequently daily discharges from the bowels.

"II. Le General d' Aigremont, aged 55, had been asthmatic for a long time, and to a very high degree. Hearing of the preceding case, he submitted to galvanization. After the first sitting, he was able to ascend three flights of steps without stopping, although previously he was obliged to stop several times in ascending one. After several applications, the amelioration was sufficient to permit singing, dancing, and ascending several flights of stairs without trouble; but it did not remain constant, owing to the full habit of the patient, to imprudences, and intractability, and to the date of the disease. It resulted, however, in great and permanent relief over the previous state.

"III. The wife of a *chef de bureau*, at the treasury, had been asthmatic for three years. The asthma was continual, but with frequent exacerbations of three to five hours, or longer, during which she did not expect to live; cough, convulsive, rale excessive, appetite null. There was a painful condition of the larynx, engorgement of the epigastrium, and frequent palpitations of the heart. She had been attended by the best physicians in the capital. M. M. Fouquier, Orfila, Leroux, and Bertin, had been called in consultation, and medical treatment exhausted. Improvement commenced with the first exhibition of galvanism. After five applications, the patient assumed a horizontal position the first time for three years. The pain at the heart was less severe; appetite good. After eight days, she ascended and descended the stairs, and walked in the court. Gradually the patient, who was in an advanced state of marasmus, recovered a portion of her embonpoint, and her other symptoms were much improved. This was

her condition at the date of publication. An examination of the lungs, by several physicians, at this time, showed the existence of emphysema, highly developed.

"M. Pascalis speaks of a metallic taste, of flashing before the eyes, of rubefaction, and the formation of pustules on the skin under the metallic conductor, and some movement of the stomach, as attendants on the galvanic application; also a strong titillation of the throat, by which the secretion of mucus is favored. Respiration becomes deeper, and expectoration free. The patients are left in a state of vigor, contrasting in a sensible manner with previous depression."

DISEASES OF THE SPINE, HEAD, ETC.

Different methods for treating the various affections of the spine, head, and other portions of the system are found necessary, to some of which we may briefly allude.

Curvatures of the Spine, which are often but the result of muscular contraction, either from weakness, or the position assumed by habit, are readily relieved by passing currents of electricity through the muscles contracted, causing them to vibrate rapidly for a few moments, and then, by changing to the opposite muscles, and finally, by passing currents through the spine generally. In connection with this treatment, it is sometimes found necessary to resort to the inclined plane, and sometimes to spinal stays, or supporters.

Spinal Weakness is directly within the practice. I have found more advantage from applications of electricity to the spine, in cases of debility and general weakness, than from any other operations I have made; indeed, in all such cases it is to be applied chiefly through the spine. Such applications are also necessary for the permanent cure of many local weaknesses. The negative conductor should be attached to a moistened sponge placed under the coccyx, and currents passed from the positive through the spine, by manipulations. In nearly all cases which have come under observation, and these are many hundred, we have found more permanent relief from moving the positive conductor from point to point along the spine, than by allowing the current to pass long from a

single point; and this is equally true in other diseases. Interrupted currents keep the nerve upon which they are passed in constant spasmodic action; and if the nerve be weak, it is soon exhausted, and is perhaps soon convulsed, injuriously affecting different organs, and prostrating the system. Gentle currents, or those only transmitted for a short period, on the contrary, strengthen the nerve, and if properly directed will at once remove convulsions.

Headache. (*Cephalalgia.*) Whether primary or symptomatic, headache may be treated with success by electricity; but in all cases, the treatment should correspond with the peculiar character of the disease. If primary, as when from mental exhaustion, or from a determination of blood to the head, etc., the hair should be first thoroughly saturated with water, or some other fluid, that the current may be passed without interruption, and then, with the negative conductor either at the feet, hands, or termination of the spine, the operator should hold the positive in one hand, while the other is employed in manipulating the head. These operations should be commenced with the slightest possible current, as the head is often peculiarly susceptible, and in no case should the hand be allowed to rest steadily upon one point, but be constantly engaged in making passes over the most sensitive parts. A current passed through the brain, constantly, in one direction, is liable to induce congestion, or inflammation, and often to cause much suffering; passed from the hand, while engaged as described, it has a sedative influence, and usually affords immediate relief.

During the past year, I have successively treated some seventy-five cases of headache by this process, when from the causes suggested, and in but a single case have I known the treatment to fail. In many of these cases, the headache had assumed a chronic form, and resisted every attempt at relief; and in all, the treatment seemed to be the last and final resort.

I have also employed the same treatment in headache from catarrh, with the most favorable results. Mr. B——, of this city, had been for some fifteen years subject to headache, not knowing to what to attribute it. The counsel of various

physicians, with their remedies, failed to impart relief. Months had been spent at cold-water institutions, etc., etc. When presented for examination, his system was emaciated, general health much impaired, and headache very violent. From the slightest cold the patient was confined to his room, and at all times quite unable to transact business. By an electropathic examination, his disease was traced to the frontal portion of the head, and pronounced catarrh, much to his surprise, as it had never been suggested before. The first operation gave much relief, and each succeeding one facilitated the cure. Fifteen operations in all were performed, within about six weeks, when the patient felt no symptoms of his former suffering, and ceased to attend.

If headache be symptomatic, or from other diseases, as from spinal affections, derangements of the stomach or liver, or an irregularity in the evacuations of the system, for the purpose of giving present relief, operations may be made upon the head; but to effect a final cure, proper attention must be paid to the part more immediately affected. For proper suggestions in such cases, reference may be made to the remarks presented upon such diseases. It is often well to subject different parts to an electropathic diagnosis, where there are doubts in respect to the real seat of disease, that full assurance may be given. In no case will such examinations fail, if rightly performed.

Epilepsy. Drs. Bird and Addison, of Guy's Hospital, relate many cases of epilepsy in their Hospital Reports, where electricity has proved entirely successful. When from hysteria, or from derangement of the uterine functions, electricity alone gives immediate relief. If other derangements are associated with the disease primarily, they may require additional treatment.

One of the most extreme cases of epilepsy came under observation in 1847, which, from the peculiar effects of electricity as employed, we give in detail. Miss A. B. T——r, of this city, aged eighteen years, was presented for treatment, July 10th. For three years had been subject to epileptic attacks, and had received the usual remedies from one of our

first practitioners, without the least relief. Disease traced to functional derangement of the uterus. Catamenia deficient in quantity and quality, respiration difficult, extremities cold, giddiness of the head, etc. Fits often last for an hour, during which she is much convulsed, requiring the assistance of several stout attendants to prevent personal injury. Is usually insensible for several hours after the spasms cease, and frequently gives evidence of insanity for some days following severe attacks. Gentle purgatives each day, with a free use of the electro-magnetic machine. Currents passed through the system generally, with special applications to the head, stomach, and through the pelvis. From an attack while in my office, July 18th, it was found that gentle shocks through the chest, when in her worst fits, would immediately restore her. This was tried on several different occasions, and with perfect success, not the least unpleasant effect following such attacks when she was thus aroused. An instrument was then placed in the family, with directions for using it whenever such returns of the disease were made, with occasional visits and general operations. From the first, the attacks became less frequent, and, except at the return of her monthly sickness, less violent. At these periods she was visited daily, and electricity faithfully applied, her catamenial discharge becoming more regular at each returning period. From February, 1848, she has been entirely free from her disease to the present writing. Epilepsy, from frights and other causes, is treated with equal success by this agent, with such medicines as are necessary to the preservation of general health.

Tumefaction. Tumors of different kinds are readily dissipated by the judicious use of electricity. In such cases, its action seems to be that of one of the most active discutients, often reducing tumors and other enlargements in a few minutes. It also restores absorption, and removes inflammation. An Irish girl, now under treatment, when presented, had enormous enlargements upon each side of her neck, rendering it quite impossible to turn her head. For about a year tumors had been observed, but until within a few weeks were neglected. Recently she had received the attention of Dr. W.,

of this city; but instead of reducing the enlargements, they had been rapidly increasing. From the first operation, the soreness and pain, which had been very great, was entirely removed and the swelling reduced. From the third, the enlargements are reduced one-half, and she, for the first time for weeks, rests with ease.

Miss C. was also under treatment in July, 1848. Tumors upon each side of her neck, varying in size from that of a chesnut to an English walnut, which had been increasing for two or three years. Ten operations with the electro-magnetic machine, with a preparation of ointment, left no remains of three or four of the tumors, while one, which was the first and largest, was just perceptible.

Tumors near the surface may be dissipated by passing currents from the electro-magnetic machine, with the directors applied to the surface, while those more deeply seated, may be treated by electro-puncture, or by shocks from the Leyden jar. In all cases, the currents should be passed as directly through the tumor as possible.

The Enlargement of the Tonsil Glands, a disease at present very prevalent, and usually called falling of the tonsils, for which no remedy but the knife has hitherto been employed with success, is readily cured by the application of this remarkable agent. In many cases I have found it to give immediate relief, and in none have I known it to fail when persevered in. An extreme case came under observation in 1847, to which I am permitted to refer. The patient was a little miss, nine years of age, of feeble health and delicate constitution. For something more than a year, she had been afflicted with this unpleasant disease, but for several weeks before she was presented to me for treatment, the affection had become much worse, so much so that it was with difficulty she could sleep at all. An eminent surgeon had examined her, and presented it as his opinion that she would not live a fortnight unless they were cut out. On the first operation with electricity, she experienced much relief, and was enabled to sleep with comparative ease on the night following. An ointment was prepared, and electrical operations made at first

on every day, and then on every other day, until in all, she received seventeen, when she was pronounced cured, and for at least one year from the last operation, she had no return of the disease. Her general health was also much improved.

Calculus. Interesting experiments have been made with electricity in the decomposition of calculus within the bladder. According to Mr. Donavan, Esq., M. R. A., who notices the subject in the *Dublin Quarterly Journal of Medical Science*, May, 1847, the idea was first conceived by Orioli, an Italian of great eminence, and Dr. Harle, of Norwich. The operation was made by transmitting a galvanic current down a metallic sound, varnished except at the point. Of the experiment, Mr. Donavan says:

M. Bouryes des Mortiere dissolved a calculus, out of the body, weighing one grain, perfectly, in twenty-four hours, by galvanism. But MM. Prevost and J. Dumas have gone far towards proving the possibility of successfully employing galvanism as a means of destroying a calculus in the bladder. A fusible human calculus, placed in water, was submitted to the action of 120 pairs of plates during twelve hours. The bases and the phosphoric acid were liberated at their respective poles, but, owing to the nature of the arrangement, they reunited in a fine powder. The weight in this period was reduced by twelve grains. Other trials were made during sixteen hours, and at the end of this time the calculus was reduced to a mass so friable that the slightest pressure reduced it to little crystalline grains, which could easily pass through the urethra. MM. Prevost and Dumas conceive that it is almost always possible to introduce into the bladder two conductors, which shall be spread out at the extremity by means of a slight spring, so that they may touch the calculus by their internal surface, which, in this part is deprived of its insulating envelope. The calculus would be thus decomposed without injury to the bladder, since the current takes the shortest distance between the two poles.

To prove that the galvanic process may take place in the bladder without injury, they introduced a properly prepared pair of conductors through the urethra of a dog into the bladder, and connected them with a pile of 135 pairs, acted on by nitro-sulphuric acid. They remarked with much satisfaction that the dog was not discoverably inconvenienced while

the bladder was distended with injections of luke-warm water; yet this same apparatus was capable of decomposing water with great energy, and furnishing torrents of gas. A fusible calculus was then fixed to a sound between the two platinum conductors, and the whole was introduced into the bladder of a large bitch; luke-warm water was injected, and the conductors were put in connection with all the troughs which composed their battery. After some slight movements, the animal was quiet, and endured the galvanic action for an hour. The calculus, when withdrawn, showed unequivocal traces of decomposition. The same process was repeated morning and night for six days; but the calculus had now become too friable to permit further repitition, and had lost weight in the same ratio as the former one. The animal was killed after a few days' repose, when it was found that the bladder was in its natural state.

"These experiments, it must be confessed, render it probable that this mode of removing calculi from the bladder may one day or other take the place of the two operations at present in use, except when the calculus consists of uric acid, which is, unfortunately, too commonly the case. The editors of the *Annales de Chimie* subjoin to this paper an observation, that nitrate of potash, dissolved in the water injected into the bladder, renders the decomposition of hard, compact phosphates as easy as that of the porous kinds. They also satisfied themselves that the bladder is not injured during the action of the pile; and they think that instruments may easily be contrived for determining the nature of the calculus on which it is proposed to operate."

SUSPENDED ANIMATION, NARCOTISM, ETC.

Such has been the success of different attempts to restore from suspended animation, from different causes, that Braithwaite asserts that "an electro-magnetic apparatus ought now to be in the possession of every surgeon." (See Retrospect, Part VII., page 33.) Dr. Todd also says:

"Electricity should always be employed in cases of suspended animation. If brought to bear upon the medulla oblongata, it will frequently succeed in exciting the respiratory acts, when other means have failed. Perhaps the most convenient method of using it is by means of the electro-dynamic machine, by placing one wire at the back of the neck high up,

and the other at the diaphragm. It was employed with marked advantage in a case which occured lately at the King's College Hospital. An infant, a few months old, got some tincture of opium by mistake; she was brought into the hospital almost lifeless; the respiration even failed to such a degree, that for two minutes she did not breathe once. Mr. Russell, and Mr. Johnson, the resident medical officers, applied electricity in the manner above described. The first and immediate effect was to excite the respiration, and soon afterwards the whole spinal cord became affected, so that at each passage of the electric current the limbs were raised convulsively. Respiration was completely re-established by these means, but the child died several hours afterwards with congested lungs." (See Med. Gaz., Dec. 23, 1842.)

Many cases of interest may be added to the above; perhaps the following, by Dr. Thomas S. Page, of Valparaiso, and published in the *Lancet*, Feb. 4, 1843, will be read with profit:

"A. T., an Englishman, the subject of this communication, aged 22 years, and of a robust frame, is a clerk in one of the most respectable commercial houses in Valparaiso. He had a slight gleet, for which he prescribed for himself pulverized cubebs, in doses of half an ounce, night and morning, and experienced from them neither good nor bad effects. On the night of the 16th of March, 1842, he went to an apothecary's shop and asked for cubebs. Not having confidence in the lad in attendance, he requested permission to examine the label on the bottle, and read thereon "Pulv. Cubeb." He then ordered an ounce, divided into two parts, and with these returned home at midnight. He immediately took one of the powders, placed himself in bed, and, as was his custom, took up a book to read; but, as he expresses it, had not read two lines before he felt a dizziness and inclination to sleep. I accidently discovered him the following morning about twelve o'clock, with these symptoms; face red and swollen; lips dark purple; mouth containing a viscid frothy saliva; tongue has a dry and chapped appearance in the centre, and the teeth are slightly coated with a brown sordes; veins of the forehead and temples turgid; eyes rolled upwards, injected, and their pupils contracted to a point: skin moderately warm and moist, with clammy pespiration; feet cold; pulse very slow, moderately full, and dispersed by the least pressure; respira-

tion very slow, short, and gasping. By agitating him violently he was aroused for a moment, uttered some incoherent expressions and sank back into comatose sleep.

These were the symptoms when I first saw him. Dr. Houston, of the Royal Navy, now practising in this place, and Dr. Barrabino, of the U. S. Navy, then attached to the U. S. schooner *Shark*, came to my assistance. We administered the sulphate of zinc as an emetic, and hot mustard and water to arouse the sensibilities of the stomach to its impression. Large draughts of this, and titillation of the fauces, produced vomiting, and a small quantity of the powder apparently was brought up. The stomach-pump was at hand, but as vomiting was readily provoked it was not used. The patient was made to sit on the edge of the bed, with his feet hanging in a tub of almost boiling water, strongly charged with mustard. One cup was applied to each temple, and about two ounces of blood abstracted. Large sinapisms were spread over the chest and stomach, and inner parts of the thighs. A very strong liniment of ammonia, cantharides, and turpentine, was applied to the whole length of the spinal column, until the skin became very red and inflamed. When the stomach seemed to be cleared of all traces of the poison, the mustard draughts were suspended, and a large quantity of olive, with castor oil, administered, but only a part remained. The patient now appeared to be sinking. The surface was cold, and covered with a damp sweat; the face was pallid, with a purplish tinge; the jaw and eye-lids were fallen, which the patient, by powerful sternutatories and severe blows on the face and shoulders with the open hand, was with difficulty made to raise. Ammonia and brandy and water were now given, with light broths, and an injection composed of turpentine an ammonia. This produced a slight discharge from the bowels. The stimulating liniment already mentioned, was repeated to the spine and over the surface of the body. The pulse was hardly perceptible at the wrists, if, at times, it was at all to be felt. The stimulants were continued.

"It was now 3, P. M. There were no signs of reaction, and the features wore the aspect of death. Under these discouraging circumstances, and when every effort seemed vainly expended, we now determined to dress the patient, and, supported by two strong assistants, to take him from his room, continue the stimulants and light broths, and endeavor to walk him in the cool air. At first he made feeble but unsuccessful efforts to direct the movements of his legs, but at length could not be aroused, made no effort to stand, and

sank almost lifeless into the arms of his assistants. He was carried to his room and placed in a slightly reclining posture on his bed. His breathing was now short and hurried; his mouth wide extended and jaw fallen; nothing seemed capable of arousing him; the exhaustion was extreme: the pulse could be felt feebly at the wrist, maintained there probably by the agitation which he had just undergone. Dr. Houston had left a short time previous. Dr. Barrabino remained with me.

"It was now 4, P. M., and, worn out with fruitless efforts, we desisted entirely from further exertion. At this conjuncture I thought of my electro-magnetic battery, and proposed its application to bring about reaction, for I felt we were justified in such desponding circumstances to make it a matter of experiment. Cerebral congestion was urged as an objection, but admitted not to be sufficient, in such a desperate case, to set aside the experiment. It was immediately tried, and with the happiest results. With an assistant rapidly rotating the wheel, I applied the balls at first to each side of the neck, and ran them down behind the clavicles. The arms and body now moved convulsively, but the patient lay as unconscious as before. I now passed one ball over the region of the heart, and the other to a corresponding point on the right side. In an instant his eyes opened widely, and with a ghastly expression of countenance; his head and body were thrown convulsively toward me, and he groaned. He now sank back into his reclining posture, and he was again asleep. The balls were reapplied in the same situation with similar results—a third and fourth time, and he cried 'No more.' Reaction was now positively established; the heart had received a strong impulse; the pulse was becoming rapidly developed, and the whole surface warm. We now determined to desist, and watching him attentively, allow him to remain quiet for an hour. Reaction continued satisfactorily, and when the hour had expired he could be awakened by shaking his body, and calling loudly his name. There was no further occasion for the battery. He was aroused at intervals; and at eleven o'clock in the evening was sufficiently awake to relate where he had got the medicine the preceding night, but was still drowsy, and when not disturbed, inclined to sleep. Thus he passed the night, and on the following morning was pretty well. He then told me that he heard many things the preceding day that were said by persons about him, but he neither felt the power to open his eyes, nor move his tongue to speak, although up to 3, P. M., when powerfully agitated and spoken

to, he would reply in short and sometimes broken sentences, and occasionally correctly. He further says, that the last thing he has any recollection of, was my remark, while they were attempting to walk him in the corridor, that nothing more could be done but to make the experiment. From that time all was blank to him, until, as he expressed it, 'he felt as if a gun had been fired off within him, which thrilled through and shook him to the very extremities.' This was the application and effect of the electro-magnetic battery."

"Mr. Corfe, of the Middlesex Hospital, has related an instance of the good effects of electricity under these circumstances. A man was admitted, having taken an ounce and a half of laudanum on the preceding evening, six hours previously. 'In the first instance I ordered the administration of the stomach pump, at which period, to all appearances, he was a lifeless corpse; the pupils were contracted to a pin-hole in size; the pulse was intermitting, and not more than 40; the respirations convulsively performed at intervals of half a minute; the face livid, and the extremities bluish and cold. After the stomach had been relieved of its contents, green tea, with ammonia, was injected therein; flagellation with thin splints and wet towels, the cold douche, turpentine stupes and sinapisms to his calves and abdomen, were applied in succession, without the least improvement in his condition. The bladder was relieved of six or eight ounces of light-coloured urine by the catheter. I then thought of a most powerful remedy, which was attended with extraordinary success. I allude to the electro-magnectic battery, conjointly with electricity, which was set to work upon him soon after four o'clock. The pulse became more steady, firm, and frequent; the respirations more indicative of resuscitation. Our powerful electrical machine was now got into full play before a large fire, and the jar filled, when some brilliant sparks and strong shocks were occasionally passed through his head, spine, thorax, and abdomen.'—*Lancet, January* 27, 1844.

"The result of this was, that the man opened his eyes, and his mouth too, abusing the operators for a pack of rascals, who were 'trying specimens' on him. But incomparably the most satisfactory effect was produced by giving him a shock on the tip of his nose. To use a phrase of the ring, he *rallied* wonderfully under this—a hint worth taking.—*Med. Chir. Rev., April*, 1844, *p.* 544."

Dr. Martin Barry employed electricity in the case of an

infant nine months old, who had been dosed with laudanum "to put it to sleep," nine hours previous to his application. The child was fast sinking under the usual symptoms of narcotic poisoning, and in this state carried to the Edinburgh Maternal Hospital, where

"Dr. Barry applied electro-galvanism, using for this purpose the apparatus made by Abraham and Danser, of Manchester. At first the mixture in the trough contained one thirty-second part of strong sulphuric acid, the quantity of which was afterwards increased to one-sixteenth, and the pointer in the index was gradually brought round to the very strongest power. The wires were applied in turn to every part of the body, and the child was roused by their application, and kept awake, or at least kept moving an arm or a leg, so long as they continued in contact with it. When the wires were removed, even for a few seconds only, it sank sound asleep, the respiration continuing unchanged. At the end of about three hours, a little more susceptible, and perhaps somewhat more energetic in the movement of its limbs; but with this exception, the infant exhibited nothing like a satisfactory revival, until the tremendous current had been made to pass through its body for four hours and three quarters. Then, however, it really did revive, the respiration becoming more quiet, and the pupils undergoing some dilatation. From this time it recovered, required no further treatment, and in a few days was quite well.

In order to arrive at something like an estimate of the quantity of laudanum swallowed, Dr. Barry caused a pennyworth to be bought at the same shop. This was measured, and the quantity, one drachm and a half, compared with what was found remaining of the other pennyworth above referred to, allowance being made for about the same quantity of water said to have been added. Say, therefore, laudanum dr. iss. × water, dr. iss. = dr. iij., of which a tea-spoonful is said to have been swallowed. There was found remaining less than two tea-spoonsful, the same spoon being used as that with which the child had been dosed. Thus a drachm of the mixture had disappeared, half of which was laudanum, or say a few minims less than half a drachm, say twenty-five minims.—(See Prov. Med. and Surg. Journal, June 17, 1846.")

A female aged twenty-nine had taken an ounce of laudanum an hour before; the stomach pump had been applied before she

got to the hospital, where the application was repeated, and electricity employed by S. P. James, Esq., who says she was in a state of the deepest insensibility when the operation was commenced and that

"When the sponge-directors were applied, for a few minutes no sensible effect was produced, but soon afterwards the muscles of the neck began to quiver, when sensibility appeared gradually to return, and after twenty or thirty minutes the stimulus produced undoubted discomfort, evinced by shrugging of the shoulders, and attempts to avoid contact with the sponges; but the first marked influence of its effect was the ejection of a large quantity of fluid from the stomach. In another hour she appeared quite lively, answered questions distinctly, and in a moderately loud tone, though in a somewhat peevish manner. The galvanism was occasionally intermitted for a few moments, when she relapsed almost instantaneously, and 'dropped off' in the midst of a sentence which she had commenced during the application of the stimulus.

The pupils remained unaffected till about two hours had elapsed, when they became somewhat more dilated, and sensible to a strong light. All the symptoms gradually diminished, but it was absoluteiy necessary to reapply it, at longer intervals, until half-past five, P. M., when she seemed so far recovered as to allow of her removal to the ward. From the easy diffusibility and quick propagation of the galvanic fluid over the whole system, irritation, capable of exciting action almost *ad libitum*, can be applied to any or even the whole part of the body at one time, and that of a nature void of all the unpleasant results which necessarily follow bastinadoing, cold effusion, searing, the dolichos pruriens, and a whole catalogue of equally brutal resources, which, for the safety of the patient, have necessarily been resorted to before galvanism was adopted. Dipping the sponges of the directors, on this occasion, in moistened salt, assisted the passage of the current, and increased the conducting power to a striking degree. In ordinary cases, where galvanism is used, the application, if strong, reddens the skin, and even produces tumefaction, which remains often for hours; but in this instance, although the power was probably three or four times as strong as is generally used, not the slightest discoloration was observable. It should be noticed, that as soon as she was allowed to fall off into a deep sleep, which she was occasionally permitted to do after the extraordinary influence of the battery was fully proved, in rousing her instantly from the deepest narcotism to a fretful impatience, the pulse gradually lowered in its

power, became slower in its action, and irregular in its movements; but no sooner was this remarkable stimulus laid on again, than the pulse rallied, was regular, fuller, and quicker; and the respirations, previously labored, slow, and unequal, became more frequent and deeper. The countenance also evidenced, in a striking manner, the singular influence of this agent. When she was admitted, the cheeks were of a leaden hue, and the lips of a tawny color; but after the expiration of one hour, with the use of the battery, it resumed a somewhat natural tint." —*Lancet, June* 19, 1847, *p.* 639.

Several cases are also reported in which electricity has been singularly effectual in restoring the unfortunate victim from suspended animation, from other causes. Brathwaite, in his Retrospect, Part XIV., p. 169, cites a case of narcotic poisoning, in which Mr. Tubbs effected a cure by the use of the battery.

"Half a tea-spoonful of Godfrey's cordial was given to an infant three weeks old; five hours afterwards when Mr. Tubbs was sent for, he found it in a state of complete narcotism. The usual treatment for narcotic poisoning was resorted to, with only temporary advantage, for eight hours; and then Mr. Tubbs found that the child was sinking, the pupils still contracted, the temperature of the body falling, and the means which had previously aroused it, had no effect. He then says:

"I sent home for an electro-magnetic battery. Removing the coil, I passed several gentle shocks along the spine and through the cardiac region. These brought on muscular contraction, which was evinced by the child throwing out its legs and hands; by the countenance becoming distorted, and by its uttering a cry. I continued the shocks for about ten minutes. The heart's action was accelerated, and the eyes were kept opened. I administered beef-tea, with ammonia, and then enveloped the whole body up to the chin in heated flannels, covered closely with an oil-skin to retain the heat, in which state it remained for many hours. On my next visit, I had the gratification of finding the little patient sucking the breast. It had recovered completely from the effects of the poison.

Dr. Ferguson, Surgeon to the Westmeath Dispensary, communicates the following case of restoration after drowning, to the *Dublin Medical Press*:—

"On Thursday evening, the 18th inst., I was requested to go in all haste to see a man of the name of James Rock, who had just been taken out of the canal, and was supposed to be dead. I was with him in four or five minutes, and found him apparently lifeless, cold, and livid. I had him forthwith removed to the county infirmary, about eight or nine hundred yards distant. I learned, in the mean time, from several persons who witnessed the scene, that he was at least six or seven minutes completely under the water, and that he had been in a state of intoxication. Finding the abdomen very much distended I immediately introduced the stomach pump, and discharged by it upwards of a gallon of water, strongly impregnated with spirits. Seeing that this, with all the ordinary means of restoring suspended animation, had failed to produce the desired effect, and that no time was to be lost, I determined on trying a plan which I have for a long time considered a likely means of bringing about the action of the heart and lungs in those cases, by immediately acting on the diaphragm, the main agent of respiration, and accordingly was prepared with the necessary apparatus. I made an incision below the seventh rib—cut down on that important muscle—laid it bare, and applied the conductors of a galvanic battery, consisting of fifty pair of plates, to it. The effect was instantaneous, and surprised all the persons present. The muscles of the chest and abdomen became spasmodically engaged; and after a few moments, I could see the spasmodic action gradually disappear, and the regular action of the chest come on, which soon increased till breathing became quite apparent, as also the circulation; and blood, now for the first time, issued from the wound I had made in the chest.

"He has continued to go on well, with the exception of some inflammatory symptoms, perhaps produced by the wound, but not unlikely, from the effects of the cold and wet he was exposed to; however, by the use of the lancet, and following up the antiphlogistic treatment, those symptoms are fast abating; and I have no doubt I shall be able to discharge him cured, from the infirmary, very shortly.

"This case must fully establish the utility of voltaic electricity in restoring suspended animation from immersion in water, by acting indirectly on the phrenic nerve and eighth pair, and thus exciting the action of the heart. It will also go to prove, in my opinion, that it is not necessary to transmit along the *channel of the nerves* this most wonderful agent, as a substitute for nervous influence.

"As immersion in cold water must hasten the extinction of life, arising from suffocation, by depriving the body of vital heat, the effect of this extraordinary power is the more remarkable,

and shows the necessity of artificial heat being applied to the body as effectively and expeditiously as possible.

"The stomach pump I consider was of much use, as by relieving the great distension of the stomach, the lungs were better able to fulfil their function, upon the galvanic influence being applied.

"In cutting down and exposing the diaphragm, much caution is necessary, so as not to wound it, however slightly, the consequences of which might be very bad."—*Dublin Medical Press, July 1st*, 1840, *p.* 8.

The following remark of the editor of the *Medical Press* upon the case above reported, is worthy of special consideration:

"We may add, that if a powerful electro-magnetic apparatus were employed, contractions of the diaphragm might be excited by simply applying the poles to the skin; and such an apparatus, we think, should exist in every establishment for the resuscitation of persons laboring under asphyxia, its power being greater, and, above all, more constant and sustained than that of the ordinary galvanic pile."

UTERINE DISEASES, MIDWIFERY, ETC.

So susceptible is the uterine system to electricity, that by its judicious application almost any desired result may be produced. As has been quoted from Dr. Bird, we find in it the only really direct emmenagogue with which the experience of our profession has furnished us. But not only is it effectual in exciting menstruation, whenever the uterus is capable of performing that function, it imparts strength in uterine weakness, arrests hemorrhage, restores in displacements, induces labor, prevents miscarriages, stimulates the system in exhaustion from protracted labor, etc., accomplishing each object according to the method in which it is employed.

1. *Chlorosis.* This disease which usually appears as the result of other affections, is often relieved by the use of electricity alone, but it is more judicious to employ it in connection with other remedies. Symptomatic diseases are to be removed, and general health improved; this may be accomplished by various operations with this agent, or by proper exercise, regu-

lar habits in diet, sleep, etc., with gentle cathartics and tonics Or, as Dr. Bird has said, "Improve the general health by exercise and tonics; remove the accumulations often present in the bowels, by appropriate purgatives; and then a few electrical shocks, often a single one, will be sufficient to produce menstruation, and at once to restore the previous deficient function." Currents from the electro-magnetic machine passed through the pelvis, and from the lumbar region down the limbs; or shocks from the Leyden jar through the pelvis, from the sacrum to the pubes, afford the most effectual treatment.

Amenorrhœa, which is an obstruction of the menses, either partial or total, from other causes than pregnancy or old age, is readily cured by electricity. As in chlorosis, however, if this derangement of the system be the result of other diseases, they are to be properly treated in its connection. In Guy's Hospital Reports, April, 1841, Dr. Bird says, scarcely any cases have been submitted to electrical treatment in which its sanatory influence has been so strongly marked, as in those in which the menstrual function was deficient. Still he contends for the use of medicines for the improvement of the general health, while it is perfectly evident that this too is restored by proper electrical treatment. His method of operating is, to pass shocks from the jar through the pelvis, from the sacrum to the pubes, and to discontinue the treatment during the menstrual discharge; but it seems to us that a milder process, and one equally as successful, is, to employ the electro-magnetic machine, not confining the operation to the pelvis, but extending it in such a manner as to improve the general health. In a majority of cases submitted to our observation, this has proved entirely successful. The spine, which is usually weak in such cases, should be operated upon, as has been suggested in another place, and it is often found beneficial to extend the operation to the limbs, as in cases of general debility. The following synopsis of cases in Guy's Hospital, treated by Dr. Bird, is from Channing's Notes, and may here be read with profit.

"I. A girl, aged 16. No return of menstruation from the first period, nine months previous, owing to a cold. Twelve shocks were passed through the pelvis. The next morning the catamenia appeared, and lasted four days.

II. A woman, aged 21, with amenorrhœa for three years. Health improved, and a slight appearance of the discharge three days previous. Twelve shocks passed through the uterus. Catamenia shortly appeared, and continued two days.

III. A girl, aged 17. Appearance chlorotic. Amenorrhœa for one year, except a slight appearance three months since. Shocks daily through the pelvis, and tonic treatment. On the third day, menstruation commenced, and continued four days.

IV. A girl, aged 18. Suffering from amenorrhœa for a year, and irregularity for four years. A slight appearance five weeks since, attended with pleurodynia. Jan. 3, 1840, shocks thrice a week, and aloetic prescription. Jan. 13, catamenia appeared, and lasted two days. Electricity intermitted for a fortnight, and recommenced Feb 4. Feb. 14, menstruation occurred freely.

V. A young woman, aged 19, with suppression for two months, Aloetic purgatives. Jan. 31, shocks through pelvis thrice a week. Feb. 10, free menstruation. Electricity suspended for a fortnight, and renewed. Menstruation returned copiously at the proper period."

Dysmenorrhœa. A difficult or painful menstruation, accompanied with severe pains in the back, loins, and bottom of the belly. This disease may be traced to ovarian weakness, and in its treatment the object should be to stimulate the ovaries, invigorate the system, and improve the general health. In this, as in every disease of the uterine system, the judicious practitioner will carefully guard his patient against the more dangerous consequences of such derangements, consumption, spinal diseases, palpitation, etc. If necessary, recourse should be had to gentle purgatives, tonics, or alteratives, but as electricity, when properly employed for each of these purposes is effectual, its application may be so varied as to answer in their place. For dysmenorrhœa when no other disease is apprehended, electro-magnetic currents should be passed through the pelvis, by placing the positive conductor under the coccyx, while the negative is employed in making passes or manipulations over the ovaries, pubes, and abdomen generally. Some authors also recommend the use of vaginal conductors, among whom is Dr. R. McDonnel, (See Dublin Med. Press, Aug. 1846,) but in our practice we have never seen a case where this treatment was necessary. Such conductors are employed for other purpo-

ses with great advantage, as in uterine hemorrhage, and where the object is to act upon the womb directly; but for the purpose of exciting menstruation only, surface conductors, of which the hand, when the operator can himself bear the current required, is the best, are only necessary. This may be employed without exposure or unpleasantness. The improved conductors or handles accompanying the newly constructed instrument, described on page 30, afford another mode of making the communication, which the patient may employ herself. In most cases, the proper use of these directors will prove effectual, and where the patient chooses self-operating instruments, they are certainly preferred.

Menorrhagia, a term usually employed to represent, not only an immoderate flow of the menses, but also uterine hemorrhage from various causes, is another derangement of the system in which electricity is of great service. As we are to speak of uterine hemorrhage from other causes in another place, we shall here only employ the term in the former sense. Excessive menstruation, which is often attended with the most violent pains, not unlike those experienced in labor, seems to be an affection of the ovaries, attended with weakness of the whole uterine system. It is, perhaps, more dangerous, and is certainly more alarming, than any of those derangements we have mentioned, and yet it is readily relieved by the application of electricity. Several cases have come under observation, where the patient, at the return of each period of menstruation, was seized with the most violent pain, fainting, etc., under which she suffered more than is usual in labor, in which a single application of electricity gave entire relief. The operation should be made in the same manner as in dysmenorrhœa, and in most cases repeated for several days in succession. In all cases the application should be made whenever the patient feels a return of those pains peculiar to the disease. Shocks from the jar should never be resorted to in this disease, the object being rather to excite contraction, and impart strength, than to stimulate as in the former disease. The most gentle currents from the electro-magnetic machine are to be employed, and these should be continued, at each operation, till the pain cease. They may be

repeated, if necessary, at every hour in the day, as the patient will improve rather than sink under the treatment.

Leucorrhœa. By its stimulating effects upon the parts affected, this morbid secretion from the uterus or vagina is often suppressed by a few gentle applications of electricity from the battery. It is always the result of either local or general weakness, and while continued it is constantly rendering the system more weak. By impairing the constitution, and deranging the more important functions of the system, it is more fatal in its results than the afflicted usually imagine. It is one of the principal causes of those derangements mentioned above, and others equally as difficult to be treated and fatal in their consequences. In connection with electricity, in this disease, other remedies are of great advantage, especially if the leucorrhœal discharge has assumed a chronic form, or become profuse. Electricity when employed, should be applied for the purpose of imparting strength, or stimulating the whole uterine system. For this purpose the electro-magnetic current, gently applied, is found most effectual, With proper conductors, it may be passed per vagina, or with surface conductors, through the pelvis in different directions, with success. It should also be applied to the spine as a stimulus. The womb syringe, of proper construction, with medicated washes, or even cold water while bathing, is an important auxiliary in the treatment of this disease.

Prolapsus Uteri, Displacements, etc. In a large number of cases I have found electricity of the greatest advantage in the treatment of prolapsus uteri, obliquities, and other displacements of the womb. Its action in such cases is to give tone to the muscular fibres and nerves which afford support to the uterus, and through the weakness of which such misfortunes usually occur. Many cases have come under observation where the patient was either confined entirely to her bed, or in the most uncomfortable manner possible, relying upon some of the mechanical means of support to which the ingenuity of the practitioner had invited her, where full and permanent cures were effected by the use of electricity. It is important in such cases that currents of little intensity be passed directly upon the nerves or muscles to be stimulated. The condition of the patient should determine the strength of the current, the manner of

operating, and the frequency of the applications. In all cases, where the object is to strengthen the part operated upon, care should be exercised in all these particulars, lest the patient be exhausted and the operation prove more injurious than beneficial. The experienced operator, however, will seldom fail in his treatment with this agent.

Midwifery. The application of electricity to the uterus, for different purposes in accouchement, is a subject upon which there has been an expression of conflicting opinions, probably growing out of the different results, at which the several operators have arrived, by their peculiar mode of operating. Opposite results have been produced by its application in similar cases, and the opinion has been expressed, that for this reason, the agent is not to be relied upon, when a little more observation has proved that such results have been entirely the effect of employing the same agent in a very different manner. To present this subject in as clear a light as possible, giving at the same time the best opportunity for employing this agent in certain cases, we shall introduce the opinion of several practitioners of eminence, and, so far as our limits will permit, in their own language.

Uterine Contraction. Muscular contraction is one of the most obvious effects of electricity, when applied to the living structure, but its peculiar effects upon the uterus in this particular was first suggested by Dr. Ramsbotham, and practically tested by Dr. Radford. In both editions of his works on obstetric medicines, Dr. Ramsbotham presents the following remark, which seems to have been the first suggestion upon the subject: "I am inclined to think that electric shocks, particularly derived from the galvanic battery, would excite the flagging powers of the uterus under labor, and, perhaps, even induce action *ab initio*. This is a means, however, of which I would not in the present state of our knowledge recommend a trial; and I only judge by analogy, in consideration of the influence the electrical fluid exerts over the nervous system generally, and through that system over the nervous fibre."

From an extensive practice in which this agent has been employed, Dr. Radford vouches for the truth of this suggestion,

and advocates its use for different purposes. In a lecture upon the subject delivered before the profession in Dec., 1844, (See Prov. Med. and Surg. Jour., Dec. 24, 1844,) he says:—

"Galvanism produces an effective and powerful contraction of the uterus; and not only so as regards its tonic contraction, but it has also the power of energetically exciting alternate contraction when applied at intervals. I can tell you most seriously and most solemnly, that it produces these two important changes upon the uterus in such a degree as in my previous reflections on the subject I had no conception of. The alternate contraction excited by this agent is analagous to, and as powerful as that which is observed in normal labor, and the tonic contraction is greater. I shall not relate cases in detail, because it would occupy too much time; but I may state that I applied galvanism in a case where the membrane was unruptured, and the uterus in a state of great inertia, and alternate contraction was immediately produced. Before this the membranes were very flaccid; but as soon as the galvanic circle was completed, they became extremely tense and protruded low down into the vagina; and this state of tension did not subside when the alternate contraction ceased, as is observed in some degree in normal labor; for although the galvanic conductors were removed, so great a degree of tonic contraction of the uterus had been induced, that this membranous bag could not collapse. I am thus satisfied that by the application of this means, we can induce such a state of tonic contraction in the uterus, that, in these extreme cases of exhaustion from hemorrhage, the woman may be placed in such a state of safety, that delivery may be postponed until the time arrives when it can be safely accomplished, and in the meantime we can have recourse to those measures which tend to raise the vital powers. I think it probable that it may also produce one of the other natural means of suppressing hemorrhage which I have already referred to, viz., coagulation of the blood; but this I have not yet positively ascertained by experiment, although I am led to conclude that such is the fact, from some remarks made by Dr. Apjohn, in the article, Galvanism, in the Cyclopædia of practical medicine.

Dr. Bird also approves of electricity in such cases, and informs us that the practice is sanctioned by Dr. Lever and others. He then relates a case communicated to him by a former pupil, of a woman aged thirty-nine, who was in her sixteenth confinement, whose pains had ceased after the liquor

amnii had been discharged, two days previously. The ergot of rye had been given without any permanent effect. As the only difficulty was ascertained to be the atony of the uterus, the electro-magnetic current was resorted to. Of its effect the operator says:—

"I was gratified in finding, after a few applications of the remedy externally and obliquely across the anterior surface of the uterus, alternately changing the position of the conducting wires, that a very decided effect was produced. Regular, strong, and frequent pains came on, and, in the course of a quarter of an hour, a living male child and placenta were expelled, attended with the least degree of hemorrhage I ever witnessed.

"The uterus was immediately firmly and permanently contracted, and, with the exception of a slight soreness across the abdomen, the patient expressed herself as feeling quite comfortable. She recovered but slowly, on account of the general debility induced by the affection of the chest, but there was not a single bad symptom connected with the uterus subsequently developed.

"I am quite aware, continues Dr. Bird, that Dr. Simpson, of Edinburgh, has expressed his opinion of the inefficiency of the electric current in such cases, and has almost denied its exercising any influence over the uterus. I confess I cannot for one moment admit the validity of his opinions when opposed by the facts of Dr. Radford, Dr. Lever, and others; but would endeavor to show the mode in which these opposite statements appear to admit of reconciliation. This is founded on the opposite effects of currents according as they follow the cause of the centripetal or centrifugal nerves. Now in the magneto-electric coil, in which currents are excited by repeatedly breaking contact by a vibrating bar, the aparatus whose construction I explained at my last lecture, we have, as I have already shown, two currents moving in opposite directions, to each of which the patient who is the subject of experiment becomes submitted. Now the currents are of unequal strength, and if the most energetic, that on breaking the contact, be passed in the direction of the *vis nervosa*, it will produce painful contractions, which the moment it passes in the opposite direction will become relaxed. For, as I have proved to you, an inverse current tends to produce paralysis and a direct contraction. Hence I should urge the accoucheur not to employ the apparatus in which both these currents traverse the patient, but simply the one I have described to you as the single current machine, and which is

now on the table before me. In using this, I would suggest the positive conductor to be placed over the lumbosacral region, and the other be carried only over the abdominal surface with a gentle friction. In this way powerful uterine contractions will be easily excited. You will never find any difficulty in getting this apparatus to act efficiently, as it possesses the great advantage of dispensing with the use of mercury, which has been hitherto employed in these single current machines. (See Medical Gazette, June 18, 1847, p. 1064.)

"At a meeting of the Obstetrical Society of Dublin, in January, 1846. Mr. Clarke gave the detail of two cases, in which he employed the induced electro-magnetic current with perfect success, in the Rotunda Lying-in Hospital of this city, in February, 1845, in one of which the membranes had been ruptured forty-nine hours, and in the other the labor had lasted sixty hours, and in each case the child as well as the mother did well. Mr. Clarke also remarked, that although this agent had been previously employed in uterine hemorrhage by Dr. Radford, of Manchester, yet that he believed that these were the first cases in which it had accomplished parturition. And after describing the method which he deems fittest for the application of the power, namely, from over the sacral plexus of nerves to the recto vaginal septum, as near the os uteri as can be done without passing the current through the head of the infant (the vaginal director being coated with sealing wax varnish, except at its external ball): he described some experiments made upon the lower animals, by means of which he proved the superiority of galvanism beyond electro-magnetism in exciting the action of the heart and vermicular motion of the intestines, after both these functions had ceased from asphyxia."—*Dublin Hospital Gaz.*, March 1, 1845, p. 216.

Uterine Hemorrhage, Inertia, etc. The practical obstetrician has ever felt the need of some agent upon which to rely for relief, when he sees his patient sinking in death, as is often the case from excessive flooding or hemorrhage. The cause of such calamities is, doubtless, in most cases, exhaustion or inertia of the uterus; and from numerous cases which may be cited, an effectual, safe, and universal remedy is found in electricity, judiciously applied.

In a paper read before the Manchester Medical Society in February, 1846, Mr. Dorrington alludes to the efficacy of this active agent, and furnishes several cases in which it has been

applied with great success. The first is a case of internal hemorrhage during labor. The pains had subsided, the os uteri was rigid, and only the size of half a crown, and the uterus quite lax; all the symptoms of exhaustion from hemorrhage apparent, with only the escape of about a pint of blood externally. Laudanum was given immediately, bandages applied, ergot administered, etc. Upon the action of the ergot, the head of the child bore down upon the os uteri, but between the pains the uterus lay very lax and inert. Dr. Radford was consulted, and the decision was, that to deliver in this case would be certain death. For the purpose of checking the flooding, and of thus allowing the patient to receive nourishment, Dr. Radford's plan of applying electricity was adopted, of which, with its effects, Mr. Dorrington thus speaks:—

"We applied one conductor of the electro-magnetic apparatus to the os uteri, and the other to the abdominal parietes over the fundus uteri. The woman immediately began to complain that we were cutting her, and the uterine action came on at once. After having used the remedy a few minutes, we desisted, and had great pleasure in finding that the tonic contraction of the uterus had been called into play. We again applied the galvanic shocks and currents, and the uterus immediately responded to the applications—strong contraction at once taking place, and the woman complaining of cutting pain. In about twenty minutes after its first application we finally ceased to use it, so firm a state of tonic contraction having been induced, that we considered it safe to leave the woman, with orders that beef-tea, broth, and eggs beaten up with milk, should be given her at intervals, and a teaspoonful of brandy in a little water, occasionally. An abdominal bandage was kept firmly applied. When we made a vaginal examination, we found the head bearing down on the os uteri with a much greater degree of pressure than had existed before the galvanism was applied, and we left with a firm conviction that the galvanic treatment had been of most essential service in this, the first case in which Dr. Radford's new plan had been tried in the human subject."

The flooding ceased, and in six hours and a half after the application of galvanism, labor pains set in, and in four hours afterwards the labor was completed.

Another case was, where the hemorrhage took place before

labor. While stooping, the patient lost two or more pints of blood, when she immediately fainted and vomited. The galvanic current was passed in the direction of both axes of the pelvis, with the most favorable result.

"The effect on the uterine fibre was most marked; the firmest tonic contraction occurred the moment the organ was stimulated, and when the conductors were finally removed, a good tonic state of the organ existed, a fact which was proved both by its hardness to the touch when examined through the abdominal walls, and by the head being in firm apposition with the internal surface of the os uteri. The constitutional effect upon the woman was very serviceable, for it acted as a general stimulus, rousing her up, and making her, to use her own words, 'feel better than she had done for months.' The pulse was 98, and stronger, and her face much less pallid. I ordered her to have an abdominal bandage put on, and to lie on her back to counteract the anterior obliquity of the uterus. About 12, P. M., nineteen hours after the galvanism was applied, labor commenced without any further hemorrhage having occurred, and terminated in about two hours and a half in the birth of a male child, which was living. The placenta was expelled, along with four or five coagula as large as the closed hand, in a quarter of an hour afterwards. The woman recovered well."

A third case, was where the patient had arrived at the eighth month of pregnancy, but suffered from the constant oozing away of blood from the uterus. The galvanic current was employed, when on examination *per vaginam*, it was found that a quantity of coagula had accumulated in this canal, of which Mr. Dorrington speaks as follows:—

"Upon carefully removing these, I found the os uteri oval in shape, dilated to the size of a penny-piece, tolerably dilatable, and almost entirely filled up by the placenta. I could just feel the membranes anteriorly, and to the left side of the uterine orifice, and I ascertained that they were unruptured, and that the head presented. There had been occasionally slight labor-pains since last night; the fœtal heart was audible just below the umbilicus. I prescribed quiet and cool regimen. At half-past one, P. M., Dr. Radford, Mr. James Kenworthy, and Mr. Runcorn, saw her in consultation with me; there was still a slight draining discharge, and the other circumstances much

the same as at my visit earlier in the day. We thought the case a favorable one in which to try the experiment of delivering the child without turning, by means of the uterine action induced by galvanism, combined with artificial rupture of the membranes. At a quarter of two, P. M., we applied the galvanic conductors in the usual way, and good strong uterine action set in at once. In about ten minutes I ruptured the membranes with Holmes' stilette, and we continued the use of the galvanism till twenty minutes past two, P. M., by which time the pains began to come on spontaneously at intervals, and the placenta had fallen down to a considerable extent into the vagina; the hemorrhage was extremely slight. At three, P. M., we left her, the labor-pains being good and regular, and the fœtal heart still audible. We ordered her to lie on her back, with a little inclination toward the left side, as there was right anterior obliquity of the uterus, and the child's head was a little too much inclined to the left side, and too far forward over the pubes.

"At five, P. M., Dr. Radford and myself returned, and found that very little change had taken place since we left. The uterine action was not so strong as it had been two hours before, and there was no hemorrhage. We reapplied the galvanism, using a greater power, and Dr. Radford carefully dragged the os uteri into the axis of the vagina, for we thought that the obliquity of the organ prevented the head from entering the pelvis. In an hour there was a decided advance; the head had descended into the brim of the pelvis, and was dilating the os uteri rapidly, and there had been no further flooding. The placenta continued to descend more and more as the labor progressed, preceding the head for some time, and indeed, when the child, which was a female, was born, its most depending portion was protruded from the os externum before the head; so that the child passed over the half-detached placenta along the vagina. Of course, as so great a separation of the after-birth had occurred, the child was born dead, though the fœtal heart was audible till half an hour before its birth. The placenta came away immediately after the child, the labor being entirely terminated at twenty-five minutes to seven, P. M. The woman recovered rapidly, and without a bad symptom. This case, so far as the life of the child was concerned, would probably have terminated in the same way under any plan of treatment, since the placenta would doubtless in any case have become detached to a great extent from the uterus before its birth."

In a case of twins, the first had been expelled by uterine efforts in about four hours after labor set in, after which the

uterus became inert and the pains ceased. In fours hours after this, Mr. Dorrington saw her, and says:—

"I considered it a good opportunity to ascertain the value of Dr. Radford's galvanic plan in renewing uterine action, so I made the necessary arrangements. In about an hour, Dr. Radford and myself, in the presence of my friend, Mr. Nursaw, and my pupil, Mr. William Black, proceeded to apply the remedy. The effect was immediate; strong labor-pains coming on, and continuing while the galvanic circle was complete. The woman cried out that she had pain similar to what she supposed might be produced by 'forks being thrust into her belly.' On examining, per vaginam, the membranes were found to be tense and protruding into the passage, and the os uteri was fully dilated. After the galvanic circle was broken, and the intervallic contraction thereby induced had gone off, it was remarkable to observe that so great a degree of tonic uterine action existed, that the amniotic bag could no longer collapse, but remained tense in the vagina, as it does at the height of a pain in normal labor. In the course of about half an hour, the intervallic uterine action was so completely excited, that we ceased to apply the galvanism; and during a pain Dr. Radford ruptured the membranes, when the foot was found presenting. I now took charge of the case, and in about a quarter of an hour, with the assistance of slight traction, a very small female child was born alive. We applied a few slight galvanic shocks to its chest, as the respiration was feeble, with a very good effect. The placenta, which was single, came away in about twenty minutes, with less discharge than is usual in twin cases."

In concluding his remarks upon the use of this remarkable agent, Mr. Dorrington says:—

"Of course, after so few trials as have yet been made with galvanism in the practice of midwifery, it is very difficult to form an opinion as to its exact value, and the particular cases in which it is likely to supersede means that have been previously adopted. That it is a very powerful remedy there can be no doubt in the minds of those who have seen it tried, and that the uterus will respond to its application, whilst the general system is completely prostrated, is equally certain. This latter circumstance is one of its peculiar merits, as I believe there is no other means by which we excite uterine contraction that is not liable to fail when severe hemorrhage has weakened the vital powers."

"From the little I have seen, my opinion is, that it is a most valuable means in that class of cases for which Dr. Radfort first recommended it, viz., uterine hemorrhage before, during, and after labor, in the latter months of pregnancy; and it must always be remembered that its application need not, in any way, lead us to neglect the ordinary methods of treating these cases, if there is any reason for giving them a previous trial. Of course, from this statement must be excepted the old plan of delivering the child where great exhaustion of the mother is present, to supersede which practice, galvanism was specially brought forward." (See Prov. Med. and Surg. Jour., March 18, 1846,)

Doctor Radford reports the case of a lady in her eighth month of pregnancy who received a fright, which was followed with a copious discharge of blood from the uterus. When he was called, the uterus was flaccid and inactive, the os uteri rigid and closed, and the hemorrhage profuse. He at once proceeded to rupture the membranes, which he did with a small catheter, and to apply friction to the abdomen. This failed to produce uterine contraction; cold applications were made, but still the hemorrhage continued. Delivery could not be effected the os uteri was so closed and rigid. Dr. Radford says:—

"Under these circumstances I determined on the application of galvanism, and therefore sent for my apparatus. When it had arrived and was made ready for use, the lever regulating the intensity of power was placed at the middle point. I now passed the vaginal conductor to the anterior edge of the os uteri —having first placed the other over the fundus, and which was held by an assistant. The circle was now completed, and the patient immediately complained that I was cutting her. The abdominal conductor was removed and reapplied on different parts of the fundus; and so also was the vaginal one changed so as to act through every part, as far as possible, of the long axis of the uterus. From the moment that the circle was complete, uterine pain was excited, and a bearing-down effort was produced. These effects were observed to be more or less intense, according to the length of time the conductors were allowed to remain applied. The uterus was felt to be tonically contracted during the intervals, and this effect was observed to be increased after each temporary action induced by the application of the connection rod.

"This plan was continued at intervals for half an hour. I now withdrew the vaginal conductor, and placed a common conductor externally on each side of the uterus, so as to pass the galvanic current in a transverse and oblique direction. In doing so I moved them from the upper to the lower part of the organ, taking care to have each placed in such a manner that every portion of the uterine tissue (as far as possible) was subjected to the influence of this remedy. From the time that the uterus began to contract, the flooding abated, and soon altogether ceased. The os uteri also began to soften, and gradually yielded, so that at the end of six hours, it was so far dilated as to allow the head of the child to pass through it. The child was born alive. The placenta was also expelled without further assistance. There was no further flooding. The uterus was found firmly contracted.

"Remarks. The power of galvanism to excite the uterine fibre to contract, was admirably shown in the foregoing case. It not only originated the temporary contraction of the uterus, but also produced such a lasting impression upon this organ, that the pains continued to occur (if any way different from those which accompany its normal action in being more energetic,) until the labor was completed. The value of the tonic contraction of the uterus in arresting bleeding, is well known to the practical obstetrician; and, as I have elsewhere observed, this favorable condition of the organ is increased in degree after each application of the galvanism. When we employ this agent, we should take care not to continue it too long, but interrupt the connection, so as to allow the uterus intervals of rest, and thus, as nearly as possible, to imitate nature's operations. It sometimes happens, that our usual means fails to produce the effect we desire; and although cases of this kind are exceptions, yet they are sufficiently numerous, and also of such a dangerous character as to demand, on the part of the obstetrician, an inquiry whether some plan can be adopted to place the patient in a state of safety. The truth of the above statement, in cases of accidental hemorrhage, is proved by the great discrepancy in the opinions of different writers as to the proper treatment to be adopted. One class recommend the membranes to be ruptured according to Puza's plan, and they assert that reliance may invariably be placed on this practice, as an infallible means of arresting the discharge.

"Another class recommend delivery (as a primary operation) as soon as it can be safely performed. They think that rupturing the membranes will frequently fail to fulfil the indica-

tions intended; and that afterwards, when the relative local condition of the patient is unfavorably altered, it will become necessary to turn and extract the child, and thus render the operation more dangerous to the patient, and more difficult to the operator. The different views entertained by these writers (all of whom are men of the highest reputation) upon a subject of such vital importance, clearly prove that sometimes the one plan, and sometimes the other, may be advantageously adopted. My experience tends to coroborate this conclusion, and I am of opinion that rupturing the membranes will not invariably succeed in arresting the bleeding, and indeed the case above detailed is an example of the truth of this assertion. In the course of my practice, I have met with many others where I have been disappointed in the results, and have been compelled to have recourse to delivery. It is, then, in such instances as these, that we can with such certainty of success bring into use this most powerful agent, galvanism, to supersede the necessity of proceeding to undertake an operation, which, when ultimately undertaken, is always attended with more or less danger to the patient, and of difficulty to the operator.

"There is also a contingent organic rigidity of the os, and an undeveloped state of the cervix uteri, which renders delivery either impossible or dangerous, or at least very hazardous. We meet with cases in which it is quite impossible to introduce two or three fingers through the os uteri without lacerating this part, and if the hand is forced through, however cautiously done, the mischief must be considerably increased; but the danger does not end here; for when the child is turned, and its more bulky parts brought rapidly (as is too frequently done,) to pass through this opening, contusion and laceration to a greater or less extent must inevitably occur.

"Are we warranted, then, to incur the risks of delivery in such cases, in order to conform to preconceived notions, or at most only obtain an apparent immediate advantage? Do we not possess other remedial means, capable of placing our patient in a state of security until the parts assume a more favorable condition for delivery? Most certainly we do—the plug in some cases, and galvanism in others. There is a dogma extant amongst writers and practitioners, which has a baneful tendency if followed, and leads to disappointment to the practitioner and danger to the patient. This I have adverted to in my lecture on galvanism, and in the following words: — I now refer particularly to that assertion of certain writers, who say, that by the evacuation of blood, the soft parts become so weakened and dilatable, that delivery can always be accomplished. . . . . The os uteri will continue undilatable, although the woman may

be in such a state of exhaustion as to be literally tottering on the brink of the grave! It is true that this state of matters does not generally exist, but it is too frequent to be overlooked in determining our line of practice.

"If these remarks wanted further corroboration than my own practice furnishes, I have the opportunity of bringing forward the testimony of one of the most worthy and practical obstetricians of our time, whose virtues stand acknowledged, and whose practical experience is unrivalled: I mean Dr. Merriman. This opinion was conveyed to me in a private letter, after he had read my lecture."

An important case is presented by Henry Wilson, Esq., surgeon, Runcorn, in the *Prov. Med. and Surg. Jour.*, April 29, 1846. The patient was two months advanced in her pregnancy, when hemorrhage from the uterus took place. When Mr. Wilson first saw her, her pulse was small and weak, and her countenance blanched. Gallic acid and cinnamon powder were given every two hours, cold applications made to the pubes and thighs, and a bandage placed around the abdomen; the room was kept cool and quiet, but still a sanguinous oozing was continued, and in about ten hours a large quantity of blood made its escape, followed by syncope and convulsions. The pulse had now become imperceptible, and the extremities cold. By the use of stimulants she was aroused, when, upon examination, the os uteri was found open and soft. Mr. Wilson observes:

"I now proceeded to inject the vagina with half a pint of cold water, and repeated the same process by rectum. The vagina was then plugged with a soft cambric handkerchief, and a full dose of ergot, with twenty minims of diluted sulphuric acid given. This dose was repeated at intervals of fifteen minutes, until six doses were taken, equivalent to three drachms of the ergot; in the meantime ammonia and brandy were almost constantly required to avert syncope. During three hours that I remained with my patient, her life appeared to depend on the assiduous administration of stimuli.

"Having left the house for a short time, I found on my return, that the tampon had been expelled, accompanied by a large quantity of blood and coagula; I decided not to reintroduce it, that I might repeat the injections of cold water. During the succeeding two hours these were administered several times, and they seemed, on each occasion, to check the discharge for a few

minutes, but the vagina soon became hot again, and the discharge reappeared. The case now appeared to be utterly hopeless. She could no longer swallow the brandy, and was only roused from a state of apparent insensibility, bordering on syncope, by the scarcely interrupted application of ammonia to the nares. The pulse had almost forsaken the wrist, being doubtfully perceptible; the eyes remained rigidly open and fixed; in short, death seemed imminent. As a dernier resort, with but faint hopes of doing any good, I resolved to try galvanism, as suggested by Dr. Radford.

"My residence being within a very short distance, I was enabled, in a few minutes, to have the apparatus in action at my patient's bed-side. A copper wire, coated with thread and sealing wax, with a ball of moistened sponge, about the size of a nut, fastened to one end of it, served for a vaginal conductor. The sponge was passed within the os uteri, and there retained. I previously ascertained that shocks could not be elicited from any part of the wire except from the sponge at its extremity. The conductor from the other pole of the apparatus was then applied over various points of the sacrum and loins, and shocks, and continuous currents of the galvanic fluid transmitted through the parts intervening between these points and the sponge at the os uteri. Ten minutes elapsed ere the patient appeared sensible of the galvanic agency. The first indication of this was observed in her countenance, her glassy, corpse-like eye brightening up with something of its wonted expression. In the course of ten minutes more, the pulse was more distinctly perceptible, and she complained of pain in the abdomen. After continuing the galvanic influence for a few minutes longer, the apparatus was withdrawn.

"The following day found her still free from hemorrhage, but she voided with the urine a fleshy substance, about the size of a fig."

Dr. Radford was called to a woman in labor with her fourth child; the membranes had ruptured, the os uteri dilated, but the uterine action had ceased, and for six hours she lay without pains, but a constant discharge of blood. This was thought to be a proper case for the use of galvanism, and it was accordingly employed.

"The power used at first was slight, but gradually increased until the lever was placed at the highest point. The two hand conductors were only used, and applied externally on opposite

points of the abdomen, varying from time to time their relative positions, thereby carrying the galvanic fluid through the longitudinal, transversal, and oblique diameter of the uterus. The beneficial influence of the remedy was soon apparent, and the extreme atonic state of the uterus was now gradually exchanged; its parietes became firmer, and the edges of the organ, which before were so soft as to appear to float amongst the abdominal viscera, from not being traceable, now became defined. This favorable organic condition proceeded; and the induced pains, at first grinding and slight, became powerfully expulsatory; and the child (a girl,) was born alive at half past one o'clock, about an hour after we began our operations. As soon as the uterine energy was fully roused, the child was rapidly and forcibly expelled. The hand was applied over the uterus, which was found firmly contracted. The discharge of blood ceased as soon as the uterus began to contract. The placenta was expelled in about five minutes; the uterus had further firmly contracted; there was not the least hemorrhage, and the constitutional condition of the patient was much improved, and indeed much better than could reasonably have been expected.

"The powerful and sanatory influence of galvanism was most decidedly obtained in the preceding case, and the great advantage of this agent is, that its effects may be carried to any degree, from first only exciting the uterus so to contract that its diameters are lessened and that its tissue comes to be applied to the body of the child.

"These, however, may be at pleasure increased, so as to accomplish the expulsion of the child and placenta. The gradual changes produced upon the uterine tissue were admirably seen in the foregoing case; and also its great power, developed by its continued application, to arrest the discharge, expel the child and the placenta, and leave the organ safe from the occurrence of *post-partum* flooding. It is well here to call to mind, that this woman had, in all former labors, serious *post-partum* floodings, and violent afterpains. In the present case, she was saved the danger of the one, and the suffering of the other. (See Prov. Med. and Surg. Jour., Sept. 22, 1847.)

In concluding a long dissertation upon the treatment of hemorrhage, published in the *Prov. Med. and Surg. Jour.*, Dec. 24, 1844, Dr. Radford says:—

"My remarks have hitherto been confined to the treatment of those cases of hemorrhage that are attended with exhaustion

before delivery, but there are other cases, to which galvanism is equally applicable. If we investigate the cases given by authors, we shall find that there are many cases of accidental hemorrhage before delivery, where artificial rupture of the membranes has not succeeded in arresting the discharge, on which account several writers, Burns and Hamilton amongst them, advocate delivery in preference to this operation. Now, the artificial rupture of the membranes is recommended for adoption, without reference to the condition of the os uteri; and it must be obvious, if this part is rigid and undilatable, and the flooding should continue although the membranes have ruptured, that it would be highly hazardous to introduce the hand and to deliver by force. In such a case galvanism would place the woman in a state of security, by exiting the contraction of the uterus. I also consider that this power would be useful in some of the hemorrhages of the early months of pregnancy.

"With regard to the after hemorrhages, especially those attended by exhaustion, I consider it particularly applicable where atony of the uterus is the principal feature of the accident. In those cases which occur previous to the expulsion of the placenta, it would be the duty of the practitioner to assure himself that this mass was not morbidly adherent to the sides of the uterus. In hour-glass contraction, and other forms of irregular uterine action after labor, I anticipate great benefit from its use. In these cases there is a loss of balance between the contractile power of different parts of the uterine fibre, one part being in a state of atony, whilst the other is in a state of firm contraction. Now, if the galvanic current be directed in the longitudinal axis of the organ, it strikes me that you might excite the longitudinal fibres to contraction, and thereby restore the balance. There are several other topics, not directly connected with the subject of this evening's lecture, which I shall slightly notice, in reference to galvanism. I am satisfied, from positive trial of the remedy, that it will be found a most important agent in tedious labor, depending upon want of power in the uterus, and where no mechanical obstacle exists. I would also suggest the probability of its proving valuable in originating uterine action *de novo*, in cases where it may be considered necessary to induce premature labor. It seems to me also to be worthy of trial in certain cases of menorrhagia in the ungravid state, where, on vaginal examination, the uterus is found to be atonic, as evidenced by its large flaccid condition, and the patulous state of the os uteri."

Premature Delivery. A case of premature delivery, by

means of electricity, is furnished in the London Medical Gazette, June, 1845, of which Channing, in his Notes, gives the following synopsis:

"From narrowness of the pelvis, a first delivery had necesarily been performed by the crotchet, and it was therefore resolved to bring about a second delivery at the eight month. Electromagnetism was employed, at intervals, for twenty minutes, the uterus becoming tense, and true pains occurring; but these ceased with the application. Eight and a half hours afterwards, the membranes ruptured, and about fifty hours later, labor commenced, and in nine hours the child was born, by uterine effort alone. A hemorrhage occurred twelve days later, from which the woman recovered. In this case, the rupture of the membranes was ascribed to the tonic state induced in the uterus. Dr. Dorrington remarks, in connection with the above case, 'I believe there is no other means by which we excite uterine contraction, which is not liable to fail, when severe hemorrhage has weakened the vital powers.'"

Abortion. In the *New York Journal of Medicine, May*, 1847, Dr. Dawes states that he has employed the galvanic current with success in two cases, where abortion was threatened, as he thought, from an irregular nervous supply to the uterus. Doubtless this is often the cause of many of the most fatal cases of this kind; but as there are many other causes for abortion, in which its use might not be even justifiable, it should be employed with great discrimination.

APPENDIX.

Since the preceeding pages were prepared, and originally issued, in the year 1849, the author has succeeded in constructing several valuable articles, by which diseases of different classes may be successfully treated, upon electrical principles, without the aid of experienced operators; a brief sketch of which he deems it proper to here introduce.

1. Galvanic Supporters, Spinal Braces, etc.—In 1851, a beautiful assortment of supporters, spinal braces and laces for different portions of the body, known as Dr. Paige's Galvanic Supporters, Galvanic Spinal Braces, and Electrometers, were introduced to the public by Dr. A. Paige, since which they have been extensively employed by him in his practice, and in different portions of the country, by the profession generally, and with the most happy results.

These supporters in form, resemble the usual abdominal supporters offered for sale, except an improvement in the springs, rendering them highly elastic, and easy in adjustment. The pads are of different metals, rendering the supporter in reality a Galvanic Battery. It may be so adjusted as to dispense entirely with the galvanic action, or to regulate it as the case may require. The advantages of such *galvanic stimuli*, in connection with excellent mechanical support, must be apparent.

So with the nicely fitted braces for the spine, and other parts. These articles so far as introduced, have given universal satisfaction, and are of themselves, sufficient to radically cure many of those local affections for which they are intended.

2. Galvanic Moxa. The term *Moxa* is from the Japnese, Artemisia Chinensis, *Moxa Japonica*, Mugworth of China, a soft lanuginous substance prepared in Japan, from the young leaves of this species of Mugworth. This Moxa is highly celebrated in the East, for its immediate action in preventing and curing many disorders. By being burned upon the skin it produces a dark colored spot, or eschar, which terminates in an ulcer, and which may be healed up, or kept open, as circumstances require.

From a long series of experiments, Dr. Paige has succeeded in constructing galvanic plates, which may be worn upon any portion of the system, and which from galvanic action produce even a more healthy eschar, the ulcer of which may be healed by its removal, or continued as the case may indicate. In all congestive, scrofulous, or nervous diseases, this *Moxa* is entirely successful. The sores to which reference is had, are in no cases painful, or their effects unfavorable.

Although this article has been but recently introduced, it has established for itself, a high reputation, and promises to become one of the most popular remedies of the age.

3. Dr. Paige's Improved induced current and direct current Machine for electrical operations, is another valuable addition to the apparatus now employed in the treatment of diseases. With this machine Dr. Paige is enabled to cure many cases of disease which his *electro-magnetic* machine, described on page 30, in this work, has failed to reach.

The greatest advantage it possesses however, is that it enables the operator to apply medical agents which Dr. Paige has also prepared for the purpose, directly to the diseased part, producing all its medicinal effects by external applications. This branch of practice and the startling physiological facts it elicits, is now attracting the attention of scientific practitioners, and is in honesty believed to be of great importance to the profession.

To those acquainted with the subject, it is a matter of great satisfaction to know that in the present tide of improvements, the hopeless invalid is cheered by various discoveries which bring peace to his anxious mind, ease to his languishing couch and health to his wasted form. Let improvements of this kind be encouraged, and a basis to other reforms, requiring health and intelligence in the subject, will be laid, that will do more to elevate the race, physically and mentally, than all other efforts united.